Appendix D

BWXT Analytical Data

CASE NARRATIVE

Fraction:	Volatiles	Method:	SW846-5035/5260B

Sample Cross Reference Table:

File	Lab ID	Client ID
H05V03.D	AE01	VBLK08
H05V04.D	S3929	VBLKQC08
H05V10.D	0307031-02ADL1	ATV-2
H05V11.D	0307031-01ADL2	ATV-1
H05V14.D	0307031-07ADL1	MVV-1
H05V15.D	0307031-08ADL1	MVV-2
H05V16.D	S659-07B1	VBLK09
H05V17.D	0307031-08ADLMS	MVV-2MS
H05V18.D	0307031-08ADLMSD	MVV-2MSD

Analytical Comments

1. The samples were "liquid", but were treated as a solid. The 14-day holding time for this fraction was met.
2. The samples were extracted as a liquid except that they were aliquoted by mass rather than volume. This allows the units to be expressed on a per kg basis; consistent with the statement of work reporting units. Results are reported on a "wet weight" basis.
3. At the time of sample receipt, it was not clear that each sample had a duplicate bottle. Therefore the laboratory analyzed each bottle received.
4. All surrogate recoveries were acceptable.
5. All MS/MSD recoveries were acceptable.
6. Because of the wide range of expected concentrations, surrogates and matrix spikes were added immediately prior to purging per Method 5035 Section 6.1.3.5.
7. The nominal reporting limit (RL) is 2000 ug/Kg.

Fraction:	Semivolatiles	Method:	SW846-3510C/8270C

Sample Cross Reference Table:

File	Lab ID	Client ID
H01SV04.D	W648-27B1	SBLK01
H01SV05.D	W648-27S1	SBLKQC01
H01SV06.D	0307031-05A	ATS
H01SV07.D	0307031-06A	ATS-D
H01SV08.D	0307031-06AMS	ATS-DMS
H01SV09.D	0307031-06AMSD	ATS-DMSD
H04SV03.D	0307031-05ADL	ATSDL
H04SV04.D	0307031-06ADL	ATS-DDL

Analytical Comments

8. The samples were "liquid", but were treated as a solid for holding time purposes. The 14-day holding time for this fraction was met.

9. The samples were extracted as a liquid except that they were aliquoted by mass rather than volume. This allows the units to be expressed on a per kg basis; consistent with the statement of work reporting units. Results are reported on a "wet weight" basis.

10. At the time of sample receipt, it was not clear that each sample had a duplicate bottle. Therefore the laboratory analyzed each bottle received.

11. All recoveries of phenol-d_5 from the sample matrix were low. One 2-fluorophenol recovery was also low. These surrogates are both volatile and acidic and as such are not chemically similar to bis(2-ethylhexyl)phthalate. All terphenyl-d_{14} recoveries from the sample matrix were also low. This may be significant since terphenyl-d_{14} bears somewhat more chemical similarity to bis(2-ethylhexyl)phthalate. All surrogate recoveries from the blank and LCS were acceptable. All other surrogate recoveries were acceptable.

12. All MS/MSD recoveries were acceptable. A bis(2-ethylhexyl)phthalate spiking standard is not routinely used in the laboratory. The samples were spiked with the laboratory's normal CLP spiking solution. The compound list for the report was modified to include 1,2,4-trichlorobenzene to measure the spike recovery for this matrix.

13. The nominal reporting limit (RL) is 5000 ug/Kg.

Fraction:	PCB	**Method:**	SW846-3510C/8082

Sample Cross Reference Table:

File	Lab ID	Client ID
H01HP04.d	W648-26B1	PBLK38
H01HP05.d	W648-26S1	LCS38
H01HP06.d	0307031-03A	ATP-D
H01HP07.d	0307031-04A	ATP
H01HP08.d	0307031-04AMS	ATPMS
H01HP09.d	0307031-04AMSD	ATPMSD

Analytical Comments

14. The samples were "liquid", but were treated as a solid for holding time purposes. The 14-day holding time for this fraction was met.

15. The samples were extracted as a liquid except that they were aliquoted by mass rather than volume. This allows the units to be expressed on a per kg basis; consistent with the statement of work reporting units. Results are reported on a "wet weight" basis.

16. At the time of sample receipt, it was not clear that each sample had a duplicate bottle. Therefore the laboratory analyzed each bottle received.

17. Decachlorobiphenyl recoveries were low from sample ATP-D on both columns. The tetrachloro-m-xylene recovery was low from PBLK38 on column 1 only. All other surrogate recoveries were acceptable.

18. All MS/MSD recoveries were acceptable.

19. The nominal reporting limit (RL) is 1000 ug/Kg.

List of data qualifiers and definitions (some qualifiers may not be required for this report):

"B" – Analyte present in the blank.
"D" – Sample reanalyzed at a higher dilution.
"E" – Concentration exceeded the upper limit of calibration.
"J" – Analyte detected, but less than the quantitation limit.
"N" – Presumptive evidence of a compound based on a library search.
"P" – Greater than 25% difference for detected concentrations from the 2 column method.
"U" – Analyte not detected. The quantitation limit is reported.

Unless otherwise stated, all results are on a "wet weight basis"
Unless already provided in this report, a statement of the estimated uncertainty of the results is available. For all items other than the conditions detailed above, these test results meet BWXT-NELS' interpretation of all requirements of NELAC.

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
ATV-1

Lab Name: BWXT SERVICES - NELS Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0307031

Matrix: (soil/water) WATER Lab Sample ID: 0307031-01ADL2

Sample wt/vol: 2.5 (g/mL) G Lab File ID: H05V11

Level: (low/med) MED Date Received: _____

% Moisture: not dec. _____ Date Analyzed: 08/05/03

GC Column: RTX-VMS ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: 5(ml) Soil Aliquot Volume: 100(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
71-55-6	1,1,1-trichloroethane	408	J
79-01-6	trichloroethene	366	J
127-18-4	tetrachloroethene	925	J

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
ATV-2

Lab Name: BWXT SERVICES - NELS Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0307031

Matrix: (soil/water) WATER Lab Sample ID: 0307031-02ADL1

Sample wt/vol: 2.5 (g/mL) G Lab File ID: H05V10

Level: (low/med) MED Date Received: _____

% Moisture: not dec. _____ Date Analyzed: 08/05/03

GC Column: RTX-VMS ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: 5(ml) Soil Aliquot Volume: 100(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
71-55-6	1,1,1-trichloroethane	510	J
79-01-6	trichloroethene	493	J
127-18-4	tetrachloroethene	1270	J

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
MVV-1

Lab Name: BWXT SERVICES - NELS Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0307031

Matrix: (soil/water) WATER Lab Sample ID: 0307031-07ADL1

Sample wt/vol: 2.5 (g/mL) G Lab File ID: H05V14

Level: (low/med) MED Date Received: _____

% Moisture: not dec. _____ Date Analyzed: 08/05/03

GC Column: RTX-VMS ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: 5(ml) Soil Aliquot Volume: 100(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
71-55-6	1,1,1-trichloroethane	2000	U
79-01-6	trichloroethene	2000	U
127-18-4	tetrachloroethene	2000	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
MVV-2

Lab Name: BWXT SERVICES - NELS Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0307031

Matrix: (soil/water) WATER Lab Sample ID: 0307031-08ADL1

Sample wt/vol: 2.6 (g/mL) G Lab File ID: H05V15

Level: (low/med) MED Date Received: _____

% Moisture: not dec. _____ Date Analyzed: 08/05/03

GC Column: RTX-VMS ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: 5(ml) Soil Aliquot Volume: 100(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
71-55-6	1,1,1-trichloroethane	1960	U
79-01-6	trichloroethene	219	J
127-18-4	tetrachloroethene	1960	U

FORM I VOA

FORM 1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
ATS

Lab Name: BWXT SERVICES - NELS Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0307031

Matrix: (soil/water) WATER Lab Sample ID: 0307031-05A

Sample wt/vol: 2.4 (g/mL) G Lab File ID: H01SV06

Level: (low/med) LOW Date Received: 07/23/03

% Moisture: 0 decanted: (Y/N) N Date Extracted:07/31/03

Concentrated Extract Volume: 1000(uL) Date Analyzed: 08/01/03

Injection Volume: _____(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
120-82-1	1,2,4-Trichlorobenzene	4150	U
117-81-7	bis(2-Ethylhexyl)phthalate	113000	E

FORM I SV

FORM 1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
ATSDL

Lab Name: BWXT SERVICES - NELS Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0307031

Matrix: (soil/water) WATER Lab Sample ID: 0307031-05ADL

Sample wt/vol: 2.4 (g/mL) G Lab File ID: H04SV03

Level: (low/med) LOW Date Received: 07/23/03

% Moisture: 0 decanted: (Y/N) N Date Extracted:07/31/03

Concentrated Extract Volume: 1000(uL) Date Analyzed: 08/04/03

Injection Volume: _____(uL) Dilution Factor: 5.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
120-82-1	1,2,4-Trichlorobenzene	20700	U
117-81-7	bis(2-Ethylhexyl)phthalate	112000	D

FORM I SV

FORM 1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
ATS-D

Lab Name: BWXT SERVICES - NELS Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0307031

Matrix: (soil/water) WATER Lab Sample ID: 0307031-06A

Sample wt/vol: 2.3 (g/mL) G Lab File ID: H01SV07

Level: (low/med) LOW Date Received: 07/23/03

% Moisture: 0 decanted: (Y/N) N Date Extracted:07/31/03

Concentrated Extract Volume: 1000(uL) Date Analyzed: 08/01/03

Injection Volume: _____(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
120-82-1	1,2,4-Trichlorobenzene	4420	U
117-81-7	bis(2-Ethylhexyl)phthalate	81700	E

FORM I SV

FORM 1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
ATS-DDL

Lab Name: BWXT SERVICES - NELS Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0307031

Matrix: (soil/water) WATER Lab Sample ID: 0307031-06ADL

Sample wt/vol: 2.3 (g/mL) G Lab File ID: H04SV04

Level: (low/med) LOW Date Received: 07/23/03

% Moisture: 0 decanted: (Y/N) N Date Extracted:07/31/03

Concentrated Extract Volume: 1000(uL) Date Analyzed: 08/04/03

Injection Volume: _____(uL) Dilution Factor: 5.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
120-82-1	1,2,4-Trichlorobenzene	22100	U
117-81-7	bis(2-Ethylhexyl)phthalate	78500	D

FORM I SV

FORM 1
PCB ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
ATP

Lab Name: BWXT SERVICES - NELS Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0307031

Matrix: (soil/water) WATER Lab Sample ID: 0307031-04A

Sample wt/vol: 1.1 (g/mL) G Lab File ID: H01HP07

Level: (low/med) LOW Date Received: 07/23/03

% Moisture: 0 decanted: (Y/N) N Date Extracted:07/30/03

Concentrated Extract Volume: 10000(uL) Date Analyzed: 08/01/03

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
11096-82-5	Aroclor-1260	1600	

FORM I PCB

FORM 1
PCB ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
ATP-D

Lab Name: BWXT SERVICES - NELS Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0307031

Matrix: (soil/water) WATER Lab Sample ID: 0307031-03A

Sample wt/vol: 1.0 (g/mL) G Lab File ID: H01HP06

Level: (low/med) LOW Date Received: 07/23/03

% Moisture: 0 decanted: (Y/N) N Date Extracted:07/30/03

Concentrated Extract Volume: 10000(uL) Date Analyzed: 08/01/03

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
11096-82-5	Aroclor-1260	8600	

FORM I PCB

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CASE NARRATIVE

Fraction:	PCB	Method:	SW846-3510C/8082

Sample Cross Reference Table:

File	Lab ID	Client ID
H27HP16.d	S648-35B1	PBLK01
H27HP17.d	S648-35S1	PBLKQC01
H27HP18.d	0308020-09A	F6-P

Analytical Comments

1. Two tetrachloro-m-xylene recoveries were elevated on column 1. All other surrogate recoveries were acceptable.
2. The concentration of Aroclor 1260 was over the calibration range in sample F6-P. The reported value is most likely biased low. In interest of time the sample was not diluted and reanalyzed.
3. The 14-day holding times for this fraction were met.
4. The nominal reporting limit (RL) is 1000 ug/Kg.

List of data qualifiers and definitions (some qualifiers may not be required for this report):

"B" – Analyte present in the blank.
"D" – Sample reanalyzed at a higher dilution.
"E" – Concentration exceeded the upper limit of calibration.
"J" – Analyte detected, but less than the quantitation limit.
"N" – Presumptive evidence of a compound based on a library search.
"P" – Greater than 25% difference for detected concentrations from the 2 column method.
"U" – Analyte not detected. The quantitation limit is reported.

Unless otherwise stated, all results are on a "wet weight basis"
Unless already provided in this report, a statement of the estimated uncertainty of the results is available. For all items other than the conditions detailed above, these test results meet BWXT-NELS' interpretation of all requirements of NELAC.

FORM 1
PCB ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
F6-P

Lab Name: BWXT SERVICES Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0308020

Matrix: (soil/water) SOIL Lab Sample ID: 0308020-09A

Sample wt/vol: 0.3 (g/mL) G Lab File ID: H27HP18

Level: (low/med) LOW Date Received: 08/08/03

% Moisture: 0 decanted: (Y/N) N Date Extracted:08/14/03

Concentrated Extract Volume: 10000(uL) Date Analyzed: 08/27/03

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
11096-82-5	Aroclor-1260	250000	EP

FORM I PCB

CASE NARRATIVE

Fraction:	Volatiles	Method:	SW846-5035/8260B

Sample Cross Reference Table:

File	Lab ID	Client ID
H26V03.D	AN01	VBLK23
H26V04.D	S3977	VBLKQC23
H26V10.D	S659-11B1DL	VBLK24
H26V11.D	0308038-01ADL	F13-V1
H26V12.D	0308038-02ADL	F13-V2
H26V13.D	0308038-05ADL	F20-V1
H26V14.D	0308038-06ADL	F20-V2

Analytical Comments

1. The samples were "liquid", but were treated as a solid for holding time purposes. The 14-day holding times for this fraction were met for the initial analyses.
2. The samples were extracted as a liquid except that they were aliquoted by mass rather than volume. This allows the units to be expressed on a per kg basis; consistent with the statement of work reporting units. Results are reported on a "wet weight" basis.
3. All surrogate recoveries were acceptable.
4. All LCS recoveries were acceptable.
5. Because of the wide range of expected concentrations, surrogates were added immediately prior to purging per Method 5035 Section 6.1.3.5.
6. The nominal reporting limit (RL) is 2000 ug/Kg.

Fraction:	Semivolatiles	Method:	SW846-3510C/8270C

Sample Cross Reference Table:

File	Lab ID	Client ID
H20SV03.D	S648-37B1	SBLK04
H20SV04.D	S648-37S1	SBLKQC04
H20SV11.D	0308038-03A	F13-S1
H20SV12.D	0308038-04A	F13-S2
H20SV13.D	0308038-04AMS	F13-S2MS
H20SV14.D	0308038-04AMSD	F13-S2MSD
H20SV15.D	0308038-07A	F20-S1
H21SV05.D	0308038-03ADL	F13-S1DL
H21SV06.D	0308038-04ADL	F13-S2DL
H21SV07.D	0308038-07ADL	F20-S1DL
H21SV08.D	0308038-08ADL	F20-S2DL

Analytical Comments

7. The samples were "liquid", but were treated as a solid for holding time purposes. The 14-day holding times for this fraction were met for the initial analyses. Samples were extracted by a water method (3510C) because of the high liquid cont and the small aliquot size.

8. Recoveries of phenol-d_5 were low. This surrogate is both volatile and acidic, and as such, is not chemically similar to the three target compounds. All of the terphenyl-d_{14} recoveries from the sample matrix were also slightly low. This may be significant since terphenyl-d_{14} bears somewhat more chemical similarity to bis(2-ethylhexyl)phthalate.

9. Several samples were diluted because of high concentrations of target compounds. All analyses are reported. The dilutions are denoted with a "DL" suffix on the sample identifiers.

10. Recovery of hexachlorobenzene from the MS/MSD and LCS was acceptable.

11. The 14-day holding times for this fraction were met on the initial analysis.

12. The nominal reporting limit (RL) is 5000 ug/Kg.

List of data qualifiers and definitions (some qualifiers may not be required for this report):

"B" – Analyte present in the blank.
"D" – Sample reanalyzed at a higher dilution.
"E" – Concentration exceeded the upper limit of calibration.
"J" – Analyte detected, but less than the quantitation limit.
"N" – Presumptive evidence of a compound based on a library search.
"P" – Greater than 25% difference for detected concentrations from the 2 column method.
"U" – Analyte not detected. The quantitation limit is reported.

Unless otherwise stated, all results are on a "wet weight basis"
Unless already provided in this report, a statement of the estimated uncertainty of the results is available. For all items other than the conditions detailed above, these test results meet BWXT-NELS' interpretation of all requirements of NELAC.

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
F13-V1

Lab Name: BWXT SERVICES Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0308038

Matrix: (soil/water) SOIL Lab Sample ID: 0308038-01ADL

Sample wt/vol: 2.6 (g/mL) G Lab File ID: H26V11

Level: (low/med) MED Date Received: 08/19/03

% Moisture: not dec. _____ Date Analyzed: 08/26/03

GC Column: RTX-VMS ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: 5(ml) Soil Aliquot Volume: 100(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
71-55-6	1,1,1-trichloroethane	1940	U
79-01-6	trichloroethene	819	J
127-18-4	tetrachloroethene	4870	

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
F13-V2

Lab Name: BWXT SERVICES Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0308038

Matrix: (soil/water) SOIL Lab Sample ID: 0308038-02ADL

Sample wt/vol: 2.6 (g/mL) G Lab File ID: H26V12

Level: (low/med) MED Date Received: 08/19/03

% Moisture: not dec. _____ Date Analyzed: 08/26/03

GC Column: RTX-VMS ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: 5(ml) Soil Aliquot Volume: 100(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
71-55-6	1,1,1-trichloroethane	1920	U
79-01-6	trichloroethene	1550	J
127-18-4	tetrachloroethene	9620	

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
F20-V1

Lab Name: BWXT SERVICES Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0308038

Matrix: (soil/water) SOIL Lab Sample ID: 0308038-05ADL

Sample wt/vol: 2.5 (g/mL) G Lab File ID: H26V13

Level: (low/med) MED Date Received: 08/19/03

% Moisture: not dec. _____ Date Analyzed: 08/26/03

GC Column: RTX-VMS ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: 5(ml) Soil Aliquot Volume: 100(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
71-55-6	1,1,1-trichloroethane	268	J
79-01-6	trichloroethene	17100	
127-18-4	tetrachloroethene	2630	

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
F20-V2

Lab Name: BWXT SERVICES Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0308038

Matrix: (soil/water) SOIL Lab Sample ID: 0308038-06ADL

Sample wt/vol: 2.5 (g/mL) G Lab File ID: H26V14

Level: (low/med) MED Date Received: 08/19/03

% Moisture: not dec. _____ Date Analyzed: 08/26/03

GC Column: RTX-VMS ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: 5(ml) Soil Aliquot Volume: 100(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
71-55-6	1,1,1-trichloroethane	305	J
79-01-6	trichloroethene	20200	
127-18-4	tetrachloroethene	3290	

FORM I VOA

FORM 1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
F13-S1

Lab Name: BWXT SERVICES Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0308038

Matrix: (soil/water) SOIL Lab Sample ID: 0308038-03A

Sample wt/vol: 2.3 (g/mL) G Lab File ID: H20SV11

Level: (low/med) LOW Date Received: 08/19/03

% Moisture: 0 decanted: (Y/N) N Date Extracted:08/20/03

Concentrated Extract Volume: 1000(uL) Date Analyzed: 08/20/03

Injection Volume: _____(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
118-74-1	Hexachlorobenzene	3900	J
117-81-7	bis(2-Ethylhexyl)phthalate	372000	E
92-52-4	1,1'-Biphenyl	3640	J

FORM I SV

FORM 1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
F13-S1DL

Lab Name: BWXT SERVICES Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0308038

Matrix: (soil/water) SOIL Lab Sample ID: 0308038-03ADL

Sample wt/vol: 2.3 (g/mL) G Lab File ID: H21SV05

Level: (low/med) LOW Date Received: 08/19/03

% Moisture: 0 decanted: (Y/N) N Date Extracted:08/20/03

Concentrated Extract Volume: 1000(uL) Date Analyzed: 08/21/03

Injection Volume: _____(uL) Dilution Factor: 10.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
118-74-1	Hexachlorobenzene	42800	U
117-81-7	bis(2-Ethylhexyl)phthalate	309000	D
92-52-4	1,1'-Biphenyl	42800	U

FORM I SV

FORM 1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
F13-S2

Lab Name: BWXT SERVICES Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0308038

Matrix: (soil/water) SOIL Lab Sample ID: 0308038-04A

Sample wt/vol: 2.0 (g/mL) G Lab File ID: H20SV12

Level: (low/med) LOW Date Received: 08/19/03

% Moisture: 0 decanted: (Y/N) N Date Extracted:08/20/03

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 08/20/03

Injection Volume: _____(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
118-74-1	Hexachlorobenzene	3350	J
117-81-7	bis(2-Ethylhexyl)phthalate	222000	E
92-52-4	1,1'-Biphenyl	2980	J

FORM I SV

FORM I
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
F13-S2DL

Lab Name: BWXT SERVICES Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0308038

Matrix: (soil/water) SOIL Lab Sample ID: 0308038-04ADL

Sample wt/vol: 2.0 (g/mL) G Lab File ID: H21SV06

Level: (low/med) LOW Date Received: 08/19/03

% Moisture: 0 decanted: (Y/N) N Date Extracted:08/20/03

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 08/21/03

Injection Volume: _____(uL) Dilution Factor: 10.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
118-74-1	Hexachlorobenzene	49100	U
117-81-7	bis(2-Ethylhexyl)phthalate	195000	D
92-52-4	1,1'-Biphenyl	49100	U

FORM I SV

FORM 1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
F20-S1

Lab Name: BWXT SERVICES Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0308038

Matrix: (soil/water) SOIL Lab Sample ID: 0308038-07A

Sample wt/vol: 2.1 (g/mL) G Lab File ID: H20SV15

Level: (low/med) LOW Date Received: 08/19/03

% Moisture: 0 decanted: (Y/N) N Date Extracted:08/20/03

Concentrated Extract Volume: 1000(uL) Date Analyzed: 08/20/03

Injection Volume: _____(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
118-74-1	Hexachlorobenzene	5470	
117-81-7	bis(2-Ethylhexyl)phthalate	214000	E
92-52-4	1,1'-Biphenyl	4730	U

FORM I SV

FORM I
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
F20-S1DL

Lab Name: BWXT SERVICES Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0308038

Matrix: (soil/water) SOIL Lab Sample ID: 0308038-07ADL

Sample wt/vol: 2.1 (g/mL) G Lab File ID: H21SV07

Level: (low/med) LOW Date Received: 08/19/03

% Moisture: 0 decanted: (Y/N) N Date Extracted: 08/20/03

Concentrated Extract Volume: 1000(uL) Date Analyzed: 08/21/03

Injection Volume: _____(uL) Dilution Factor: 10.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
118-74-1	Hexachlorobenzene	5210	DJ
117-81-7	bis(2-Ethylhexyl)phthalate	190000	D
92-52-4	1,1'-Biphenyl	47300	U

FORM I SV

FORM 1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
F20-S2

Lab Name: BWXT SERVICES Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0308038

Matrix: (soil/water) SOIL Lab Sample ID: 0308038-08A

Sample wt/vol: 2.1 (g/mL) G Lab File ID: H20SV16

Level: (low/med) LOW Date Received: 08/19/03

% Moisture: 0 decanted: (Y/N) N Date Extracted:08/20/03

Concentrated Extract Volume: 1000(uL) Date Analyzed: 08/20/03

Injection Volume: _____(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
118-74-1	Hexachlorobenzene	5780	
117-81-7	bis(2-Ethylhexyl)phthalate	214000	E
92-52-4	1,1'-Biphenyl	523	J

FORM I SV

FORM 1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
F20-S2DL

Lab Name: BWXT SERVICES Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0308038

Matrix: (soil/water) SOIL Lab Sample ID: 0308038-08ADL

Sample wt/vol: 2.1 (g/mL) G Lab File ID: H21SV08

Level: (low/med) LOW Date Received: 08/19/03

% Moisture: 0 decanted: (Y/N) N Date Extracted:08/20/03

Concentrated Extract Volume: 1000(uL) Date Analyzed: 08/21/03

Injection Volume: _____(uL) Dilution Factor: 10.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
118-74-1	Hexachlorobenzene	5530	DJ
117-81-7	bis(2-Ethylhexyl)phthalate	195000	D
92-52-4	1,1'-Biphenyl	47100	D

FORM I SV

CASE NARRATIVE

Fraction:	Semivolatiles	Method:	SW846-3510C/8270C

Sample Cross Reference Table:

File	Lab ID	Client ID
H15SV03.D	S648-34B1	SBLK03
H15SV04.D	S648-34S1	SBLKQC03
H15SV05.D	0308010-03A	F12S1
H15SV06.D	0308010-03AMS	F12S1MS
H15SV07.D	0308010-03AMSD	F12S1MSD
H15SV08.D	0308010-04A	F12S2
H15SV09.D	0308010-07A	F9AS1
H15SV10.D	0308010-08A	F9AS2
H20SV03.D	S648-37B1	SBLK04
H20SV04.D	S648-37S1	SBLKQC04
H20SV05.D	0308010-03ARE	F12S1RE
H20SV06.D	0308010-04ARE	F12S2RE
H20SV07.D	0308010-07ARE	F9AS1RE
H20SV08.D	0308010-08ARE	F9AS2RE

Analytical Comments

1. The samples were "liquid", but were treated as a solid for holding time purposes. The 14-day holding times for this fraction were met for the initial analyses. Samples were extracted by a water method (3510C) because of the high liquid content and the small aliquot size.

2. For the original extractions/analysis runs: Recoveries of phenol-d_5 and 2-fluorophenol were low. These surrogates are both volatile and acidic and as such are not chemically similar to the three target compounds. Some of the 2,4,6-tribromomphenol recoveries were also low. All but one of the terphenyl-d_{14} recoveries from the sample matrix were also low (6-11% recovery). This may be significant since terphenyl-d_{14} bears somewhat more chemical similarity to bis(2-ethylhexyl)phthalate. The 2-fluorobiphenyl and nitrobenzene-d_5 recoveries from sample F12S1MS were also low. All other surrogate recoveries were acceptable.

3. Due to the low recoveries of the surrogates, the samples were re-extracted and re-analyzed. The recoveries of phenol-d_5 and 2-fluorophenol were still low. All the terphenyl-d_{14} recoveries from the sample matrix were also still low (40-47% recovery).

4. Samples were spiked with hexachlorobenxene. The hexachlorobenzene recoveries were low. Recovery of hexachlorobenzene from the LCS was acceptable.

5. The 14-day holding times for this fraction were met.

6. The nominal reporting limit (RL) is 5000 ug/Kg.

List of data qualifiers and definitions (some qualifiers may not be required for this report):

"B" – Analyte present in the blank.
"D" – Sample reanalyzed at a higher dilution.
"E" – Concentration exceeded the upper limit of calibration.
"J" – Analyte detected, but less than the quantitation limit.
"N" – Presumptive evidence of a compound based on a library search.

List of data qualifiers and definitions (some qualifiers may not be required for this report):

"P" – Greater than 25% difference for detected concentrations from the 2 column method.

"U" – Analyte not detected. The quantitation limit is reported.

Unless otherwise stated, all results are on a "wet weight basis"

Unless already provided in this report, a statement of the estimated uncertainty of the results is available. For all items other than the conditions detailed above, these test results meet BWXT-NELS' interpretation of all requirements of NELAC.

FORM 1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
F12S1

Lab Name: BWXT SERVICES Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0308010

Matrix: (soil/water) SOIL Lab Sample ID: 0308010-03A

Sample wt/vol: 2.3 (g/mL) G Lab File ID: H15SV05

Level: (low/med) LOW Date Received: 08/04/03

% Moisture: 0 decanted: (Y/N) N Date Extracted:08/13/03

Concentrated Extract Volume: 1000(uL) Date Analyzed: 08/15/03

Injection Volume: _____(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
118-74-1	Hexachlorobenzene	4310	U
117-81-7	bis(2-Ethylhexyl)phthalate	21000	
92-52-4	1,1'-Biphenyl	4310	U

FORM I SV

FORM 1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
F12S2

Lab Name: BWXT SERVICES Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0308010

Matrix: (soil/water) SOIL Lab Sample ID: 0308010-04A

Sample wt/vol: 2.0 (g/mL) G Lab File ID: H15SV08

Level: (low/med) LOW Date Received: 08/04/03

% Moisture: 0 decanted: (Y/N) N Date Extracted:08/13/03

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 08/15/03

Injection Volume: _____(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
118-74-1	Hexachlorobenzene	4940	U
117-81-7	bis(2-Ethylhexyl)phthalate	19200	
92-52-4	1,1'-Biphenyl	4940	U

FORM I SV

FORM 1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
F9AS1

Lab Name: BWXT SERVICES Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0308010

Matrix: (soil/water) SOIL Lab Sample ID: 0308010-07A

Sample wt/vol: 2.0 (g/mL) G Lab File ID: H15SV09

Level: (low/med) LOW Date Received: 08/04/03

% Moisture: 0 decanted: (Y/N) N Date Extracted:08/13/03

Concentrated Extract Volume: 1000(uL) Date Analyzed: 08/15/03

Injection Volume: _____(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
118-74-1	Hexachlorobenzene	4940	U
117-81-7	bis(2-Ethylhexyl)phthalate	9900	
92-52-4	1,1'-Biphenyl	4940	U

FORM I SV

FORM 1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
F9AS2

Lab Name: BWXT SERVICES Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0308010

Matrix: (soil/water) SOIL Lab Sample ID: 0308010-08A

Sample wt/vol: 2.5 (g/mL) G Lab File ID: H15SV10

Level: (low/med) LOW Date Received: 08/04/03

% Moisture: 0 decanted: (Y/N) N Date Extracted:08/13/03

Concentrated Extract Volume: 1000(uL) Date Analyzed: 08/15/03

Injection Volume: _____(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
118-74-1	Hexachlorobenzene	4080	U
117-81-7	bis(2-Ethylhexyl)phthalate	13500	
92-52-4	1,1'-Biphenyl	4080	U

FORM I SV

FORM 1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
F12S1RE

Lab Name: BWXT SERVICES Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0308010

Matrix: (soil/water) SOIL Lab Sample ID: 0308010-03ARE

Sample wt/vol: 2.2 (g/mL) G Lab File ID: H20SV05

Level: (low/med) LOW Date Received: 08/04/03

% Moisture: 0 decanted: (Y/N) N Date Extracted:08/20/03

Concentrated Extract Volume: 1000(uL) Date Analyzed: 08/20/03

Injection Volume: _____(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
118-74-1	Hexachlorobenzene	975	J
117-81-7	bis(2-Ethylhexyl)phthalate	52400	
92-52-4	1,1'-Biphenyl	4640	U

FORM I SV

FORM 1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
F12S2RE

Lab Name: BWXT SERVICES Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0308010

Matrix: (soil/water) SOIL Lab Sample ID: 0308010-04ARE

Sample wt/vol: 2.3 (g/mL) G Lab File ID: H20SV06

Level: (low/med) LOW Date Received: 08/04/03

% Moisture: 0 decanted: (Y/N) N Date Extracted:08/20/03

Concentrated Extract Volume: 1000(uL) Date Analyzed: 08/20/03

Injection Volume: _____(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
118-74-1	Hexachlorobenzene	778	J
117-81-7	bis(2-Ethylhexyl)phthalate	40400	
92-52-4	1,1'-Biphenyl	4280	U

FORM I SV

FORM 1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
F9AS1RE

Lab Name: BWXT SERVICES Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0308010

Matrix: (soil/water) SOIL Lab Sample ID: 0308010-07ARE

Sample wt/vol: 2.3 (g/mL) G Lab File ID: H20SV07

Level: (low/med) LOW Date Received: 08/04/03

% Moisture: 0 decanted: (Y/N) N Date Extracted:08/20/03

Concentrated Extract Volume: 1000(uL) Date Analyzed: 08/20/03

Injection Volume: _____(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
118-74-1	Hexachlorobenzene	4420	U
117-81-7	bis(2-Ethylhexyl)phthalate	26400	
92-52-4	1,1'-Biphenyl	4420	U

FORM I SV

FORM 1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
F9AS2RE

Lab Name: BWXT SERVICES Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0308010

Matrix: (soil/water) SOIL Lab Sample ID: 0308010-08ARE

Sample wt/vol: 2.3 (g/mL) G Lab File ID: H20SV08

Level: (low/med) LOW Date Received: 08/04/03

% Moisture: 0 decanted: (Y/N) N Date Extracted:08/20/03

Concentrated Extract Volume: 1000(uL) Date Analyzed: 08/20/03

Injection Volume: _____(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
118-74-1	Hexachlorobenzene	4410	U
117-81-7	bis(2-Ethylhexyl)phthalate	20600	
92-52-4	1,1'-Biphenyl	4410	U

FORM I SV

CASE NARRATIVE

Fraction:	Volatiles	Method:	SW846-5035/5260B

Sample Cross Reference Table:

File	Lab ID	Client ID
H06V03.D	AF01	VBLK10
H06V04.D	S3933	VBLKQC10
H06V05.D	0307042-01ADL	F8V1
H06V06.D	0307042-02ADL	F8V2
H06V07.D	0307042-03ADL	F9V1
H06V08.D	0307042-04ADL	F9V2
H07V03.D	AG01	VBLK11
H07V04.D	S3936	LCS11
H07V05.D	0307042-02ADL	F8V2RE
H07V06.D	0307042-03ADL	F9V1RE

Analytical Comments

1. The samples were "liquid", but were treated as a solid for holding time purposes. The 14-day holding times for this fraction were met for the initial analyses. The re-analyses were performed one day after expiration of the holding time.

2. Sample dilutions were based on conversations with the customer. There were no target detects in any of the samples. The two samples that were expected to be high level samples were re-diluted and reanalyzed to meet the reporting limits. The re-analyses are denoted on the forms with an "RE" suffix on the sample identifiers. The re-analyses were performed one day after expiration of the holding times.

3. The samples were extracted as a liquid except that they were aliquoted by mass rather than volume. This allows the units to be expressed on a per kg basis; consistent with the statement of work reporting units. Results are reported on a "wet weight" basis.

4. All surrogate recoveries were acceptable.

5. Because of the wide range of expected concentrations, surrogates were added immediately prior to purging per Method 5035 Section 6.1.3.5.

6. The nominal reporting limit (RL) is 2000 ug/Kg.

List of data qualifiers and definitions (some qualifiers may not be required for this report):

"B" – Analyte present in the blank.
"D" – Sample reanalyzed at a higher dilution.
"E" – Concentration exceeded the upper limit of calibration.
"J" – Analyte detected, but less than the quantitation limit.
"N" – Presumptive evidence of a compound based on a library search.
"P" – Greater than 25% difference for detected concentrations from the 2 column method.
"U" – Analyte not detected. The quantitation limit is reported.

Unless otherwise stated, all results are on a "wet weight basis"
Unless already provided in this report, a statement of the estimated uncertainty of the results is available. For all items other than the conditions detailed above, these test results meet BWXT-NELS' interpretation of all requirements of NELAC.

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.: F8V1

Lab Name: BWXT SERVICES - NELS Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0307042

Matrix: (soil/water) WATER Lab Sample ID: 0307042-01ADL

Sample wt/vol: 2.5 (g/mL) G Lab File ID: H06V05

Level: (low/med) MED Date Received: 07/25/03

% Moisture: not dec. _____ Date Analyzed: 08/06/03

GC Column: RTX-VMS ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: 5(ml) Soil Aliquot Volume: 100(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
71-55-6	1,1,1-trichloroethane	1990	U
79-01-6	trichloroethene	1990	U
127-18-4	tetrachloroethene	1990	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
F8V2

Lab Name: BWXT SERVICES - NELS Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0307042

Matrix: (soil/water) WATER Lab Sample ID: 0307042-02ADL

Sample wt/vol: 2.5 (g/mL) G Lab File ID: H06V06

Level: (low/med) MED Date Received: 07/25/03

% Moisture: not dec. _____ Date Analyzed: 08/06/03

GC Column: RTX-VMS ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: 5(ml) Soil Aliquot Volume: 50(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
71-55-6	1,1,1-trichloroethane	3980	U
79-01-6	trichloroethene	3980	U
127-18-4	tetrachloroethene	3980	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
F8V2RE

Lab Name: BWXT SERVICES - NELS Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0307042

Matrix: (soil/water) WATER Lab Sample ID: 0307042-02ADL

Sample wt/vol: 2.5 (g/mL) G Lab File ID: H07V05

Level: (low/med) MED Date Received: 07/25/03

% Moisture: not dec. _____ Date Analyzed: 08/07/03

GC Column: RTX-VMS ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: 5(ml) Soil Aliquot Volume: 100(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
71-55-6	1,1,1-trichloroethane	1990	U
79-01-6	trichloroethene	1990	U
127-18-4	tetrachloroethene	1990	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
F9V1

Lab Name: BWXT SERVICES - NELS Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0307042

Matrix: (soil/water) WATER Lab Sample ID: 0307042-03ADL

Sample wt/vol: 2.5 (g/mL) G Lab File ID: H06V07

Level: (low/med) MED Date Received: 07/25/03

% Moisture: not dec. _____ Date Analyzed: 08/06/03

GC Column: RTX-VMS ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: 5(ml) Soil Aliquot Volume: 50(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
71-55-6	1,1,1-trichloroethane	4000	U
79-01-6	trichloroethene	4000	U
127-18-4	tetrachloroethene	4000	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
F9V1RE

Lab Name: BWXT SERVICES - NELS Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0307042

Matrix: (soil/water) WATER Lab Sample ID: 0307042-03ADL

Sample wt/vol: 2.5 (g/mL) G Lab File ID: H07V06

Level: (low/med) MED Date Received: 07/25/03

% Moisture: not dec. _____ Date Analyzed: 08/07/03

GC Column: RTX-VMS ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: 5(ml) Soil Aliquot Volume: 100(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
71-55-6	1,1,1-trichloroethane	2000	U
79-01-6	trichloroethene	2000	U
127-18-4	tetrachloroethene	2000	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
F9V2

Lab Name: BWXT SERVICES - NELS Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0307042

Matrix: (soil/water) WATER Lab Sample ID: 0307042-04ADL

Sample wt/vol: 2.5 (g/mL) G Lab File ID: H06V08

Level: (low/med) MED Date Received: 07/25/03

% Moisture: not dec. _____ Date Analyzed: 08/06/03

GC Column: RTX-VMS ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: 5(ml) Soil Aliquot Volume: 100(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
71-55-6	1,1,1-trichloroethane	1970	U
79-01-6	trichloroethene	1970	U
127-18-4	tetrachloroethene	1970	U

FORM I VOA

CASE NARRATIVE

Fraction:	Volatiles	Method:	SW846-5035/8260B

Sample Cross Reference Table:

File	Lab ID	Client ID
H15V03.D	AL01	VBLK18
H15V04.D	S3963	VBLKQC18
H15V05.D	S659-09B1	VBLK19
H15V06.D	0308010-01ADL	F12V1
H15V07.D	0308010-02ADL	F12V2
H15V08.D	0308010-05ADL	F9AV1
H15V09.D	0308010-06ADL	F9AV2
H15V03.D	AL01	VBLK18
H15V04.D	S3963	VBLKQC18

Analytical Comments

1. The samples were "liquid", but were treated as a solid for holding time purposes. The 14-day holding times for this fraction were met for the initial analyses.

2. The samples were extracted as a liquid except that they were aliquoted by mass rather than volume. This allows the units to be expressed on a per kg basis; consistent with the statement of work reporting units. Results are reported on a "wet weight" basis.

3. All surrogate recoveries were acceptable.

4. These samples were analyzed along with the next (chronological) batch of samples. A sample from that batch was spiked. All LCS recoveries were acceptable.

5. Because of the wide range of expected concentrations, surrogates were added immediately prior to purging per Method 5035 Section 6.1.3.5.

6. The nominal reporting limit (RL) is 2000 ug/Kg.

Fraction:	Semivolatiles	Method:	SW846-3510C/8270C

Sample Cross Reference Table:

File	Lab ID	Client ID
H15SV03.D	S648-34B1	SBLK03
H15SV04.D	S648-34S1	SBLKQC03
H15SV05.D	0308010-03A	F12S1
H15SV06.D	0308010-03AMS	F12S1MS
H15SV07.D	0308010-03AMSD	F12S1MSD
H15SV08.D	0308010-04A	F12S2
H15SV09.D	0308010-07A	F9AS1
H15SV10.D	0308010-08A	F9AS2

Analytical Comments

7. The samples were "liquid", but were treated as a solid for holding time purposes. The 14-day holding times for this fraction were met for the initial analyses. Samples were extracted by a water method (3510C) because of the high liquid content and the small aliquot size.

8. Recoveries of phenol-d_5 and 2-fluorophenol were low. These surrogates are both volatile and acidic and as such are not chemically similar to the three target compounds. Some of the 2,4,6-tribromomphenol recoveries were also low. All but one of the terphenyl-d_{14} recoveries from the sample matrix were also low. This may be significant since terphenyl-d_{14} bears somewhat more chemical similarity to bis(2-ethylhexyl)phthalate. The 2-fluorobiphenyl and nitrobenzene-d_5 recoveries from sample F12S1MS were also low. All other surrogate recoveries were acceptable.

9. Samples were spiked with hexachkorobenxene. The hexachlorobenzene recoveries were low. Recovery of hexachlorobenzene from the LCS was acceptable.

10. The 14-day holding times for this fraction were met.

11. The nominal reporting limit (RL) is 5000 ug/Kg.

List of data qualifiers and definitions (some qualifiers may not be required for this report):

"B" – Analyte present in the blank.
"D" – Sample reanalyzed at a higher dilution.
"E" – Concentration exceeded the upper limit of calibration.
"J" – Analyte detected, but less than the quantitation limit.
"N" – Presumptive evidence of a compound based on a library search.
"P" – Greater than 25% difference for detected concentrations from the 2 column method.
"U" – Analyte not detected. The quantitation limit is reported.

Unless otherwise stated, all results are on a "wet weight basis"
Unless already provided in this report, a statement of the estimated uncertainty of the results is available. For all items other than the conditions detailed above, these test results meet BWXT-NELS' interpretation of all requirements of NELAC.

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
F12V1

Lab Name: BWXT SERVICES Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0308010

Matrix: (soil/water) WATER Lab Sample ID: 0308010-01ADL

Sample wt/vol: 2.6 (g/mL) G Lab File ID: H15V06

Level: (low/med) MED Date Received: 08/04/03

% Moisture: not dec. _____ Date Analyzed: 08/15/03

GC Column: RTX-VMS ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: 5(ml) Soil Aliquot Volume: 100(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
71-55-6	1,1,1-trichloroethane	1910	U
79-01-6	trichloroethene	1910	U
127-18-4	tetrachloroethene	1910	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
F12V2

Lab Name: BWXT SERVICES Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0308010

Matrix: (soil/water) WATER Lab Sample ID: 0308010-02ADL

Sample wt/vol: 2.6 (g/mL) G Lab File ID: H15V07

Level: (low/med) MED Date Received: 08/04/03

% Moisture: not dec. _____ Date Analyzed: 08/15/03

GC Column: RTX-VMS ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: 5(ml) Soil Aliquot Volume: 100(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
71-55-6	1,1,1-trichloroethane	1950	U
79-01-6	trichloroethene	1950	U
127-18-4	tetrachloroethene	1950	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
F9AV1

Lab Name: BWXT SERVICES Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0308010

Matrix: (soil/water) WATER Lab Sample ID: 0308010-05ADL

Sample wt/vol: 2.6 (g/mL) G Lab File ID: H15V08

Level: (low/med) MED Date Received: 08/04/03

% Moisture: not dec. _____ Date Analyzed: 08/15/03

GC Column: RTX-VMS ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: 5(ml) Soil Aliquot Volume: 100(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
71-55-6	1,1,1-trichloroethane	1890	U
79-01-6	trichloroethene	1890	U
127-18-4	tetrachloroethene	1890	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
F9AV2

Lab Name: BWXT SERVICES Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0308010

Matrix: (soil/water) WATER Lab Sample ID: 0308010-06ADL

Sample wt/vol: 2.6 (g/mL) G Lab File ID: H15V09

Level: (low/med) MED Date Received: 08/04/03

% Moisture: not dec. _____ Date Analyzed: 08/15/03

GC Column: RTX-VMS ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: 5(ml) Soil Aliquot Volume: 100(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
71-55-6	1,1,1-trichloroethane	1930	U
79-01-6	trichloroethene	1930	U
127-18-4	tetrachloroethene	1930	U

FORM I VOA

FORM 1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
F12S1

Lab Name: BWXT SERVICES Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0308010

Matrix: (soil/water) SOIL Lab Sample ID: 0308010-03A

Sample wt/vol: 2.3 (g/mL) G Lab File ID: H15SV05

Level: (low/med) LOW Date Received: 08/04/03

% Moisture: 0 decanted: (Y/N) N Date Extracted: 08/13/03

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 08/15/03

Injection Volume: _____(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
118-74-1	Hexachlorobenzene	4310	U
117-81-7	bis(2-Ethylhexyl)phthalate	21000	
92-52-4	1,1'-Biphenyl	4310	U

FORM I SV

FORM 1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
F12S2

Lab Name: BWXT SERVICES Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0308010

Matrix: (soil/water) SOIL Lab Sample ID: 0308010-04A

Sample wt/vol: 2.0 (g/mL) G Lab File ID: H15SV08

Level: (low/med) LOW Date Received: 08/04/03

% Moisture: 0 decanted: (Y/N) N Date Extracted:08/13/03

Concentrated Extract Volume: 1000(uL) Date Analyzed: 08/15/03

Injection Volume: _____(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
118-74-1	Hexachlorobenzene	4940	U
117-81-7	bis(2-Ethylhexyl)phthalate	19200	
92-52-4	1,1'-Biphenyl	4940	U

FORM I SV

FORM 1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
F9AS1

Lab Name: BWXT SERVICES Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0308010

Matrix: (soil/water) SOIL Lab Sample ID: 0308010-07A

Sample wt/vol: 2.0 (g/mL) G Lab File ID: H15SV09

Level: (low/med) LOW Date Received: 08/04/03

% Moisture: 0 decanted: (Y/N) N Date Extracted:08/13/03

Concentrated Extract Volume: 1000(uL) Date Analyzed: 08/15/03

Injection Volume: _____(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
118-74-1	Hexachlorobenzene	4940	U
117-81-7	bis(2-Ethylhexyl)phthalate	9900	
92-52-4	1,1'-Biphenyl	4940	U

FORM I SV

FORM 1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
F9AS2

Lab Name: BWXT SERVICES Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0308010

Matrix: (soil/water) SOIL Lab Sample ID: 0308010-08A

Sample wt/vol: 2.5 (g/mL) G Lab File ID: H15SV10

Level: (low/med) LOW Date Received: 08/04/03

% Moisture: 0 decanted: (Y/N) N Date Extracted:08/13/03

Concentrated Extract Volume: 1000(uL) Date Analyzed: 08/15/03

Injection Volume: _____(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
118-74-1	Hexachlorobenzene	4080	U
117-81-7	bis(2-Ethylhexyl)phthalate	13500	
92-52-4	1,1'-Biphenyl	4080	U

FORM I SV

CASE NARRATIVE

Fraction:	Volatiles	Method:	SW846-5035/8260B

Sample Cross Reference Table:

File	Lab ID	Client ID
I16V03.D	AS01	VBLK31
I16V04.D	S4013	LCS31
I16V08.D	S659-12B1	VBLK32
I16V09.D	0309016-01ADL	F22-V1
I16V10.D	0309016-02ADL	F22-V2
I16V11.D	0309016-02ADLMS	F22-V2MS
I16V12.D	0309016-02ADLMSD	F22-V2MSD

Analytical Comments

1. The samples were "liquid", but were treated as a solid for holding time purposes. The 14-day holding times for this fraction were met for the initial analyses.
2. The samples were extracted as a liquid except that they were aliquoted by mass rather than volume. This allows the units to be expressed on a per kg basis; consistent with the statement of work reporting units. Results are reported on a "wet weight" basis.
3. All surrogate recoveries were acceptable.
4. All MS/MSD recoveries were acceptable.
5. Because of the wide range of expected concentrations, surrogates were added immediately prior to purging per Method 5035 Section 6.1.3.5.
6. The nominal reporting limit (RL) is 2000 ug/Kg.

Fraction:	Semivolatiles	Method:	SW846-3510C/8270C

Sample Cross Reference Table:

File	Lab ID	Client ID
I11sv09.d	S648-47B1	SBLK15
I11sv10.d	S648-47S1	SBLKQC15
I11sv11.d	0309016-03A	F22-S1
I11sv12.d	0309016-04A	F22-S2
I11sv13.d	0309016-04AMS	F22-S2MS
I11sv14.d	0309016-04AMSD	F22-S2MSD

Analytical Comments

7. The samples were "liquid", but were treated as a solid for holding time purposes. The 14-day holding times for this fraction were met for the initial analyses. Samples were extracted by a water method (3510C) because of the high liquid cont and the small aliquot size.

8. The terphenyl-d_{14} recoveries were slightly low from all of the sample matrices. The terphenyl-d_{14} recoveries from the blank and LCS were well within the acceptable range. All other surrogate recoveries were acceptable.

9. There was a small amount of bis(2-ethylhexyl)phthalate in the blank. Bis(2-ethylhexyl)phthalate is a common laboratory contaminant.

10. Recovery of hexachlorobenzene from the MS/MSD and LCS was acceptable.

11. The 14-day holding times for this fraction were met.

12. The nominal reporting limit (RL) is 5000 ug/Kg.

Fraction:	PCB	Method:	SW846-3510C/8082

Sample Cross Reference Table:

File	Lab ID	Client ID
I12HP16.d	S648-46B1	PBLK09
I12HP17.d	S648-46S1	PBLKQC09
I12HP18.d	0309016-05A	F22-P
I12HP19.d	0309016-05AMS	F22-PMS
I12HP20.d	0309016-05AMSD	F22-PMSD

Analytical Comments

13. All surrogate recoveries were acceptable.

14. All MS/MSD recoveries were acceptable.

15. The 14-day holding times for this fraction were met.

16. The nominal reporting limit (RL) is 1000 ug/Kg.

List of data qualifiers and definitions (some qualifiers may not be required for this report):

"B" – Analyte present in the blank.
"D" – Sample reanalyzed at a higher dilution.
"E" – Concentration exceeded the upper limit of calibration.
"J" – Analyte detected, but less than the quantitation limit.
"N" – Presumptive evidence of a compound based on a library search.
"P" – Greater than 25% difference for detected concentrations from the 2 column method.
"U" – Analyte not detected. The quantitation limit is reported.

Unless otherwise stated, all results are on a "wet weight basis"
Unless already provided in this report, a statement of the estimated uncertainty of the results is available. For all items other than the conditions detailed above, these test results meet BWXT-NELS' interpretation of all requirements of NELAC.

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
F22-V1

Lab Name: BWXT SERVICES Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0309016

Matrix: (soil/water) SOIL Lab Sample ID: 0309016-01ADL

Sample wt/vol: 2.6 (g/mL) G Lab File ID: I16V09

Level: (low/med) MED Date Received: 09/05/03

% Moisture: not dec. _____ Date Analyzed: 09/16/03

GC Column: RTX-VMS ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: 5(ml) Soil Aliquot Volume: 100(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
71-55-6	1,1,1-trichloroethane	1950	U
79-01-6	trichloroethene	1950	U
127-18-4	tetrachloroethene	1950	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
F22-V2

Lab Name: BWXT SERVICES Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0309016

Matrix: (soil/water) SOIL Lab Sample ID: 0309016-02ADL

Sample wt/vol: 2.5 (g/mL) G Lab File ID: I16V10

Level: (low/med) MED Date Received: 09/05/03

% Moisture: not dec. _____ Date Analyzed: 09/16/03

GC Column: RTX-VMS ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: 5(ml) Soil Aliquot Volume: 100(ul)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
71-55-6	1,1,1-trichloroethane	1990	U
79-01-6	trichloroethene	1440	J
127-18-4	tetrachloroethene	1060	J

FORM I VOA

FORM 1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
F22-S1

Lab Name: BWXT SERVICES Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0309016

Matrix: (soil/water) SOIL Lab Sample ID: 0309016-03A

Sample wt/vol: 2.0 (g/mL) G Lab File ID: I11SV11

Level: (low/med) LOW Date Received: 09/05/03

% Moisture: 0 decanted: (Y/N) N Date Extracted: 09/09/03

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 09/11/03

Injection Volume: _____(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
118-74-1	Hexachlorobenzene	670	J
117-81-7	bis(2-Ethylhexyl)phthalate	33800	B
92-52-4	1,1'-Biphenyl	4920	U

FORM I SV

FORM 1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
F22-S2

Lab Name: BWXT SERVICES Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0309016

Matrix: (soil/water) SOIL Lab Sample ID: 0309016-04A

Sample wt/vol: 2.1 (g/mL) G Lab File ID: I11SV12

Level: (low/med) LOW Date Received: 09/05/03

% Moisture: 0 decanted: (Y/N) N Date Extracted:09/09/03

Concentrated Extract Volume: 1000(uL) Date Analyzed: 09/11/03

Injection Volume: _____(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
118-74-1	Hexachlorobenzene	4760	U
117-81-7	bis(2-Ethylhexyl)phthalate	17700	B
92-52-4	1,1'-Biphenyl	4760	U

FORM I SV

FORM 1
PCB ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
F22-P

Lab Name: BWXT SERVICES Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0309016

Matrix: (soil/water) SOIL Lab Sample ID: 0309016-05A

Sample wt/vol: 1.2 (g/mL) G Lab File ID: I12HP18

Level: (low/med) LOW Date Received: 09/05/03

% Moisture: 0 decanted: (Y/N) N Date Extracted:09/09/03

Concentrated Extract Volume: 10000(uL) Date Analyzed: 09/12/03

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
11096-82-5	Aroclor-1260	6600	

FORM I PCB

CASE NARRATIVE

Fraction:	Volatiles	Method:	SW846-5035/8260B

Sample Cross Reference Table:

File	Lab ID	Client ID
H26V03.D	AN01	VBLK23
H26V04.D	S3977	VBLKQC23
H26V10.D	S659-11B1DL	VBLK24
H26V15.D	0308042-01ADL	F16-V1
H26V16.D	0308042-02ADL	F16-V2
H26V17.D	0308042-06ADL	F21-V1
H26V18.D	0308042-07ADL	F21-V2
H26V19.D	0308042-07ADLMS	F21-V2MS
H26V20.D	0308042-07ADLMSD	F21-V2MSD

Analytical Comments

1. The samples were "liquid", but were treated as a solid for holding time purposes. The 14-day holding times for this fraction were met for the initial analyses.

2. The samples were extracted as a liquid except that they were aliquoted by mass rather than volume. This allows the units to be expressed on a per kg basis; consistent with the statement of work reporting units. Results are reported on a "wet weight" basis.

3. All surrogate recoveries were acceptable.

4. All MS/MSD recoveries were acceptable.

5. Because of the wide range of expected concentrations, surrogates were added immediately prior to purging per Method 5035 Section 6.1.3.5.

6. The nominal reporting limit (RL) is 2000 ug/Kg.

Fraction:	Semivolatiles	Method:	SW846-3510C/8270C

Sample Cross Reference Table:

File	Lab ID	Client ID
I03SV03.D	S648-43B1	SBLK09
I03SV04.D	S648-43S1	LCS09
I03SV05.D	0308042-03A	F16-S1
I03SV06.D	0308042-04A	F16-S2
I03SV07.D	0308042-08A	F21-S1
I03SV08.D	0308042-09A	F21-S2
I03SV09.D	0308042-09AMS	F21-S2MS
I03SV10.D	0308042-09AMSD	F21-S2MSD

Analytical Comments

7. The samples were "liquid", but were treated as a solid for holding time purposes. The 14-day holding times for this fraction were met for the initial analyses. Samples were extracted by a water method (3510C) because of the high liquid cont and the small aliquot size.

8. All surrogates were acceptable

9. Recovery of hexachlorobenzene from the MS/MSD and LCS was acceptable.

10. The 14-day holding times for this fraction were met.

11. The nominal reporting limit (RL) is 5000 ug/Kg.

Fraction:	PCB	**Method:**	SW846-3510C/8082

Sample Cross Reference Table:

File	Lab ID	Client ID
I03HP03.d	S648-44B1	PBLK02
I03HP04.d	S648-44S1	LCS02
I03HP05.d	0308042-05A	F16P
I03HP06.d	0308042-10A	F21P
I03HP07.d	0308042-10AMS	F21PMS
I03HP08.d	0308042-10AMSD	F21PMSD

Analytical Comments

12. All surrogate recoveries were acceptable.

13. All MS/MSD recoveries were acceptable.

14. The 14-day holding times for this fraction were met.

15. The nominal reporting limit (RL) is 1000 ug/Kg.

List of data qualifiers and definitions (some qualifiers may not be required for this report):

"B" – Analyte present in the blank.
"D" – Sample reanalyzed at a higher dilution.
"E" – Concentration exceeded the upper limit of calibration.
"J" – Analyte detected, but less than the quantitation limit.
"N" – Presumptive evidence of a compound based on a library search.
"P" – Greater than 25% difference for detected concentrations from the 2 column method.
"U" – Analyte not detected. The quantitation limit is reported.

Unless otherwise stated, all results are on a "wet weight basis"
Unless already provided in this report, a statement of the estimated uncertainty of the results is available. For all items other than the conditions detailed above, these test results meet BWXT-NELS' interpretation of all requirements of NELAC.

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
F16-V1

Lab Name: BWXT SERVICES Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0308042

Matrix: (soil/water) SOIL Lab Sample ID: 0308042-01ADL

Sample wt/vol: 2.6 (g/mL) G Lab File ID: H26V15

Level: (low/med) MED Date Received: 08/22/03

% Moisture: not dec. _____ Date Analyzed: 08/26/03

GC Column: RTX-VMS ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: 5(ml) Soil Aliquot Volume: 100(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
71-55-6	1,1,1-trichloroethane	1930	U
79-01-6	trichloroethene	1930	U
127-18-4	tetrachloroethene	1930	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.: F16-V2

Lab Name: BWXT SERVICES Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0308042

Matrix: (soil/water) SOIL Lab Sample ID: 0308042-02ADL

Sample wt/vol: 2.6 (g/mL) G Lab File ID: H26V16

Level: (low/med) MED Date Received: 08/22/03

% Moisture: not dec. _____ Date Analyzed: 08/26/03

GC Column: RTX-VMS ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: 5(ml) Soil Aliquot Volume: 100(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
71-55-6	1,1,1-trichloroethane	1960	U
79-01-6	trichloroethene	1960	U
127-18-4	tetrachloroethene	1960	U

FORM I VOA

FORM I
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
F21-V1

Lab Name: BWXT SERVICES Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0308042

Matrix: (soil/water) SOIL Lab Sample ID: 0308042-06ADL

Sample wt/vol: 2.5 (g/mL) G Lab File ID: H26V17

Level: (low/med) MED Date Received: 08/22/03

% Moisture: not dec. _____ Date Analyzed: 08/26/03

GC Column: RTX-VMS ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: 5(ml) Soil Aliquot Volume: 100(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
71-55-6	1,1,1-trichloroethane	1960	U
79-01-6	trichloroethene	952	J
127-18-4	tetrachloroethene	1960	U

FORM I VOA

FORM 1
VOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
F21-V2

Lab Name: BWXT SERVICES Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0308042

Matrix: (soil/water) SOIL Lab Sample ID: 0308042-07ADL

Sample wt/vol: 2.6 (g/mL) G Lab File ID: H26V18

Level: (low/med) MED Date Received: 08/22/03

% Moisture: not dec. _____ Date Analyzed: 08/26/03

GC Column: RTX-VMS ID: 0.53 (mm) Dilution Factor: 1.0

Soil Extract Volume: 5(ml) Soil Aliquot Volume: 100(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
71-55-6	1,1,1-trichloroethane	1950	U
79-01-6	trichloroethene	740	J
127-18-4	tetrachloroethene	1950	U

FORM I VOA

FORM 1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
F16-S1

Lab Name: BWXT SERVICES Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0308042

Matrix: (soil/water) SOIL Lab Sample ID: 0308042-03A

Sample wt/vol: 2.1 (g/mL) G Lab File ID: I03SV05

Level: (low/med) LOW Date Received: 08/22/03

% Moisture: 0 decanted: (Y/N) N Date Extracted:09/02/03

Concentrated Extract Volume: 1000(uL) Date Analyzed: 09/03/03

Injection Volume: _____(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
118-74-1	Hexachlorobenzene	605	J
117-81-7	bis(2-Ethylhexyl)phthalate	29500	
92-52-4	1,1'-Biphenyl	4730	U

FORM I SV

FORM 1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
F16-S2

Lab Name: BWXT SERVICES Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0308042

Matrix: (soil/water) SOIL Lab Sample ID: 0308042-04A

Sample wt/vol: 2.0 (g/mL) G Lab File ID: I03SV06

Level: (low/med) LOW Date Received: 08/22/03

% Moisture: 0 decanted: (Y/N) N Date Extracted:09/02/03

Concentrated Extract Volume: 1000(uL) Date Analyzed: 09/03/03

Injection Volume: _____(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
118-74-1	Hexachlorobenzene	4920	U
117-81-7	bis(2-Ethylhexyl)phthalate	274000	
92-52-4	1,1'-Biphenyl	4920	U

FORM I SV

FORM 1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
F21-SI

Lab Name: BWXT SERVICES Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0308042

Matrix: (soil/water) SOIL Lab Sample ID: 0308042-08A

Sample wt/vol: 2.0 (g/mL) G Lab File ID: I03SV07

Level: (low/med) LOW Date Received: 08/22/03

% Moisture: 0 decanted: (Y/N) N Date Extracted:09/02/03

Concentrated Extract Volume: 1000(uL) Date Analyzed: 09/03/03

Injection Volume: _____(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
118-74-1	Hexachlorobenzene	736	J
117-81-7	bis(2-Ethylhexyl)phthalate	22800	
92-52-4	1,1'-Biphenyl	4940	U

FORM I SV

FORM 1
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
F21-S2

Lab Name: BWXT SERVICES Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0308042

Matrix: (soil/water) SOIL Lab Sample ID: 0308042-09A

Sample wt/vol: 2.2 (g/mL) G Lab File ID: I03SV08

Level: (low/med) LOW Date Received: 08/22/03

% Moisture: 0 decanted: (Y/N) N Date Extracted:09/02/03

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 09/03/03

Injection Volume: _____(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
118-74-1	Hexachlorobenzene	818	J
117-81-7	bis(2-Ethylhexyl)phthalate	25700	
92-52-4	1,1'-Biphenyl	4450	U

FORM I SV

FORM I
PCB ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
F16P

Lab Name: BWXT SERVICES Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0308042

Matrix: (soil/water) SOIL Lab Sample ID: 0308042-05A

Sample wt/vol: 1.2 (g/mL) G Lab File ID: I03HP05

Level: (low/med) LOW Date Received: 08/22/03

% Moisture: 0 decanted: (Y/N) N Date Extracted:09/02/03

Concentrated Extract Volume: 10000(uL) Date Analyzed: 09/03/03

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
11096-82-5	Aroclor-1260	1600	

FORM I PCB

FORM 1
PCB ORGANICS ANALYSIS DATA SHEET

CLIENT SAMPLE NO.
F21P

Lab Name: BWXT SERVICES Contract:

Lab Code: Case No.: SAS No.: SDG No.: 0308042

Matrix: (soil/water) SOIL Lab Sample ID: 0308042-1DA

Sample wt/vol: 1.0 (g/mL) G Lab File ID: I03HP06

Level: (low/med) LOW Date Received: 08/22/03

% Moisture: 0 decanted: (Y/N) N Date Extracted:09/02/03

Concentrated Extract Volume: 10000(uL) Date Analyzed: 09/03/03

Injection Volume: 1.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: 7.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
11096-82-5	Aroclor-1260	2600	

FORM I PCB

Appendix E

HKM Engineering
Analytical Data

HKM ENGINEERING

05-Aug-03 11:21 am

Client: MSE/TA-V-TANKS CO/S
BIF: 010685

Sample ID	Collected Date	Customer's Sample ID	Chloride (mg/L)
030702H001	06/19/2003	F-1B	29.0
030702H002	06/24/2003	F-2A	8230
030702H003	06/25/2003	F-4	148
030702H006	06/30/2003	F-5-CH	154

Review

MSE/TA - V -Tanks CO/S
TCLP Metals
Batch No.: Hg3700

SAMPLE ID	FIELD ID	Cr (mg/L)	Hg (mg/L)
IDL		0.010	0.0001
CRDL		0.010	0.0002
030702H007	F-5-MH	0.312	37.9
030702H008	LO-M	298	200

HKM Laboratory

Reviewed by KAD

MSE/TA - V -Tanks CO/S
QA/QC Summary
TCLP Metals
Batch No.: Hg3700
Values in mg/L

SAMPLE ID	FIELD ID	Cr (mg/L)	Hg (mg/L)
IDL		0.010	0.0001
CRDL		0.010	0.0002
PBW		0.010 U	0.0001 U
QCS		0.499	0.0067
QCS TRUE VALUE		0.500	0.0070
% RECOVERY		99.8	96.3
030702H007	F-5-MH	0.312	37.9000
030702H007R	F-5-MHR	0.302	38.5000
RPD		3.3	1.6
030702H007A	F-5-MH	2.430	39.5000
030702H007	F-5-MHA	0.312	37.9000
SPIKE ADDED		2.000	0.0010
% RECOVERY		105.9	N/A

HKM Laboratory

Reviewed by KAD

HKM ENGINEERING

Client: MSE/Jay Cornish
Project: V Tank

Volatile Organic Compounds
EPA Method 8260B

Extraction Method: EPA 5030
Sample Matrix: Water
Date Reported: 07/29/2003
Date Sampled: 06/19/2003
Date Received: 06/19/2003
Date Analyzed: 07/02/2003
Lab Id.: 030626M001
Sample Id: F - 1B - 1
Dilution: 10X

Compound	CAS No.	Result (µg/L)	Qualifier
1,1,1-Trichloroethane	156-59-2	< 1.0	0.28 J
Trichloroethene	79-01-6	5.1	
Tetrachloroethene	127-18-4	< 1.0	0.53 J

Surrogate Report

Compound	Conc. Added (µg/L)	Conc. Found (µg/L)	% Rec.	QC Range
Dibromofluoromethane	10.0	9.94	99.4	80 - 120
1,2-Dichloroethane-d_4	10.0	9.78	97.8	80 - 120
Toluene-d_8	10.0	9.81	98.1	80 - 120
4-Bromofluorobenzene	10.0	9.43	94.3	80 - 120

U - compound not detected
J - compound detected, but concentration less than quantitation limit

Review

HKM ENGINEERING

Volatile Organic Compounds
EPA Method 8260B

Extraction Method:	**EPA 5030**
Sample Matrix:	**Water**
Date Reported:	**07/29/2003**
Date Sampled:	**06/19/2003**
Date Received:	**06/19/2003**
Date Analyzed:	**07/02/2003**
Lab Id.:	**030626M001**
Sample Id:	**F - 1B - 1**
Dilution:	**100X**

Client: MSE/Jay Cornish
Project: V Tank

Compound	CAS No.	Result (µg/L)	Qualifier
1,1,1-Trichloroethane	156-59-2	< 1.0	U
Trichloroethene	79-01-6	< 1.0	0.63 J
Tetrachloroethene	127-18-4	< 1.0	U

Surrogate Report

Compound	Conc. Added (µg/L)	Conc. Found (µg/L)	% Rec.	QC Range
Dibromofluoromethane	10.0	10.26	102.6	80 - 120
1,2-Dichloroethane-d_4	10.0	10.70	107.0	80 - 120
Toluene-d_8	10.0	9.88	98.8	80 - 120
4-Bromofluorobenzene	10.0	9.47	94.7	80 - 120

U - compound not detected
J - compound detected, but concentration less than quantitation limit

Review

HKM ENGINEERING

Volatile Organic Compounds
EPA Method 8260B

Extraction Method:	**EPA 5030**
Sample Matrix:	**Water**
Date Reported:	**07/29/2003**
Date Sampled:	**06/19/2003**
Date Received:	**06/19/2003**
Date Analyzed:	**07/02/2003**
Lab Id.:	**030626M001**
Sample Id:	**F-1B-1**
Dilution:	**1000X**

Client: MSE/Jay Cornish
Project: V Tank

		Result	
Trichloroethene	**79-01-6**	**< 1.0**	**0.11 J**
Tetrachloroethene	127-18-4	< 1.0	U

Surrogate Report

Compound	Conc. Added (µg/L)	Conc. Found (µg/L)	% Rec.	QC Range
Dibromofluoromethane	10.0	10.50	105.0	80 - 120
1,2-Dichloroethane-d_4	10.0	10.15	101.5	80 - 120
Toluene-d_8	10.0	10.03	100.3	80 - 120
4-Bromofluorobenzene	10.0	8.77	87.7	80 - 120

U - compound not detected
J - compound detected, but concentration less than quantitation limit

Review

HKM ENGINEERING

Volatile Organic Compounds
EPA Method 8260B

Extraction Method:	**EPA 5030**
Sample Matrix:	**Water**
Date Reported:	**07/29/2003**
Date Sampled:	**06/19/2003**
Date Received:	**06/19/2003**
Date Analyzed:	**07/02/2003**
Lab Id.:	**030626M002**
Sample Id:	**F - 1B - 2**
Dilution:	**10X**

Client: MSE/Jay Cornish
Project: V Tank

Compound	CAS No.	Result (µg/L)	Qualifier
1,1,1-Trichloroethane	156-59-2	< 1.0	0.35 J
Trichloroethene	79-01-6	5.7	
Tetrachloroethene	127-18-4	< 1.0	0.67 J

Surrogate Report

Compound	Conc. Added (µg/L)	Conc. Found (µg/L)	% Rec.	QC Range
Dibromofluoromethane	10.0	11.29	112.9	80 - 120
1,2-Dichloroethane-d_4	10.0	10.66	106.6	80 - 120
Toluene-d_8	10.0	10.52	105.2	80 - 120
4-Bromofluorobenzene	10.0	9.32	93.2	80 - 120

U - compound not detected
J - compound detected, but concentration less than quantitation limit

CPO
Review

HKM ENGINEERING

Volatile Organic Compounds
EPA Method 8260B

Client: MSE/Jay Cornish
Project: V Tank

Extraction Method:	**EPA 5030**
Sample Matrix:	**Water**
Date Reported:	**07/29/2003**
Date Sampled:	**06/19/2003**
Date Received:	**06/19/2003**
Date Analyzed:	**07/02/2003**
Lab Id.:	**030626M002**
Sample Id:	**F - 1B- 2**
Dilution:	**100X**

Compound	CAS No.	Result (µg/L)	Qualifier
1,1,1-Trichloroethane	156-59-2	< 1.0	U
Trichloroethene	**79-01-6**	**< 1.0**	**0.60 J**
Tetrachloroethene	127-18-4	< 1.0	U

Surrogate Report

Compound	Conc. Added (µg/L)	Conc. Found (µg/L)	% Rec.	QC Range
Dibromofluoromethane	10.0	10.15	101.5	80 - 120
1,2-Dichloroethane-d_4	10.0	10.26	102.6	80 - 120
Toluene-d_8	10.0	9.47	94.7	80 - 120
4-Bromofluorobenzene	10.0	9.71	97.1	80 - 120

U - compound not detected
J - compound detected, but concentration less than quantitation limit

Review

HKM ENGINEERING

Volatile Organic Compounds
EPA Method 8260B

Client: MSE/Jay Cornish
Project: V Tank

Extraction Method: EPA 5030
Sample Matrix: Water
Date Reported: 07/29/2003
Date Sampled: 06/19/2003
Date Received: 06/19/2003
Date Analyzed: 07/02/2003
Lab Id.: 030626M002
Sample Id: F-1B-2
Dilution: 1000X

Compound	CAS No.	Result (µg/L)		Qualifier
1,1,1-Trichloroethane	156-59-2	< 1.0		U
Dibromofluoromethane	10.0	10.28	102.8	80 - 120
1,2-Dichloroethane-d_4	10.0	10.78	107.8	80 - 120
Toluene-d_8	10.0	10.02	100.2	80 - 120
4-Bromofluorobenzene	10.0	8.77	87.7	80 - 120

U - compound not detected
J - compound detected, but concentration less than quantitation limit

Review

HKM ENGINEERING

Volatile Organic Compounds
EPA Method 8260B

Client: MSE/Jay Cornish
Project: V Tank

Extraction Method:	**EPA 5030**
Sample Matrix:	**Water**
Date Reported:	**07/22/2003**
Date Sampled:	**06/30/2003**
Date Received:	**06/30/2003**
Date Analyzed:	**07/02/2003**
Lab Id.:	**030702H004**
Sample Id:	**F-5-VH**
Dilution:	**10X**

Compound	CAS No.	Result (µg/L)	Qualifier
1,1,1-Trichloroethane	**156-59-2**	**< 1.0**	**0.97 J**
Trichloroethene	**79-01-6**	**1.9**	
Tetrachloroethene	127-18-4	< 1.0	U

Surrogate Report

Compound	Conc. Added (µg/L)	Conc. Found (µg/L)	% Rec.	QC Range
Dibromofluoromethane	10.0	10.24	102.4	80 - 120
1,2-Dichloroethane-d_4	10.0	11.10	111.0	80 - 120
Toluene-d_8	10.0	10.17	101.7	80 - 120
4-Bromofluorobenzene	10.0	9.15	91.5	80 - 120

U - compound not detected
J - compound detected, but concentration less than quantitation limit

Review

HKM ENGINEERING

Volatile Organic Compounds
EPA Method 8260B

Client: MSE/Jay Cornish
Project: V Tank

Extraction Method: EPA 5030
Sample Matrix: Water
Date Reported: 07/22/2003
Date Sampled: 06/30/2003
Date Received: 06/30/2003
Date Analyzed: 07/02/2003
Lab Id.: 030702H004
Sample Id: F-5-VH
Dilution: 100X

Compound	CAS No.	Result (µg/L)	Qualifier
1,1,1-Trichloroethane	156-59-2	< 1.0	U
Trichloroethene	**79-01-6**	**< 1.0**	**0.25 J**
Tetrachloroethene	127-18-4	< 1.0	U

Surrogate Report

Compound	Conc. Added (µg/L)	Conc. Found (µg/L)	% Rec.	QC Range
Dibromofluoromethane	10.0	**10.57**	**105.7**	**80 - 120**
1,2-Dichloroethane-d_4	10.0	9.81	98.1	80 - 120
Toluene-d_8	**10.0**	**9.51**	**95.1**	**80 - 120**
4-Bromofluorobenzene	10.0	9.19	91.9	80 - 120

U - compound not detected
J - compound detected, but concentration less than quantitation limit

Review

HKM ENGINEERING

Volatile Organic Compounds
EPA Method 8260B

Extraction Method:	**EPA 5030**
Sample Matrix:	**Water**
Date Reported:	**07/22/2003**
Date Sampled:	**06/30/2003**
Date Received:	**06/30/2003**
Date Analyzed:	**07/02/2003**
Lab Id.:	**030702H004**
Sample Id:	**F-5-VH**
Dilution:	**1000X**

Client: MSE/Jay Cornish
Project: V Tank

Compound	CAS No.	Result (µg/L)	Qualifier
1,1,1-Trichloroethane	156-59-2	< 1.0	U
Trichloroethene	79-01-6	< 1.0	U
Tetrachloroethene	127-18-4	< 1.0	U

Surrogate Report

Compound	Conc. Added (µg/L)	Conc. Found (µg/L)	% Rec.	QC Range
Dibromofluoromethane	10.0	10.59	105.9	80 - 120
1,2-Dichloroethane-d_4	10.0	9.61	96.1	80 - 120
Toluene-d_8	10.0	9.67	96.7	80 - 120
4-Bromofluorobenzene	10.0	9.60	96.0	80 - 120

U - compound not detected
J - compound detected, but concentration less than quantitation limit

Review

HKM ENGINEERING

Volatile Organic Compounds
EPA Method 8260B

Laboratory Reagent Blank

Method 8260B

Extraction Method: EPA 5030
Sample Matrix: Water
Date Reported: 07/22/2003
Date Sampled: N/A
Date Received: N/A
Date Analyzed: 07/02/2003

Client: MSE/Jay Cornish
Project: V Tank
Lab Id.: 0702LRB1

Compound	CAS No.	Result (µg/L)	Qualifier
1,1,1-Trichloroethane	156-59-2	< 1.0	U
Trichloroethene	79-01-6	< 1.0	U
Tetrachloroethene	127-18-4	< 1.0	U

Surrogate Report

Compound	Conc. Added (µg/L)	Conc. Found (µg/L)	% Rec.	QC Range
Dibromofluoromethane	10.0	10.61	106.1	80 - 120
1,2-Dichloroethane-d_4	10.0	9.38	93.8	80 - 120
Toluene-d_8	10.0	10.21	102.1	80 - 120
4-Bromofluorobenzene	10.0	9.34	93.4	80 - 120

U - compound not detected
J - compound detected, but concentration less than quantitation limit

Review

HKM ENGINEERING

Volatile Organic Compounds
EPA Method 8260B

Date Reported: 07/22/2003

Extraction Method: EPA 5030
Date Analyzed: 07/02/2003
Sample Matrix: Water

Laboratory Control Sample

Method 8260B

Client: MSE/Jay Cornish
Project: V Tank
Description: 0702LCS1

Compound	Conc. Added (µg/L)	Conc. Found (µg/L)	% Rec.	QC Range
1,1,1-Trichloroethane	10.0	8.79	87.9	70-130
Trichloroethene	10.0	10.13	101.3	70-130
Tetrachloroethene	10.0	9.42	94.2	70-130

Surrogate Report

Compound	Conc. Added (µg/L)	Conc. Found (µg/L)	% Rec.	QC Range
Dibromofluoromethane	10.0	9.78	97.8	80 - 120
1,2-Dichloroethane-d_4	10.0	9.64	96.4	80 - 120
Toluene-d_8	10.0	9.73	97.3	80 - 120
4-Bromofluorobenzene	10.0	10.51	105.1	80 - 120

CPA
Review

Water Volatile Duplicate Report

Method 8260B

Project: V Tank

Lab Name: HKM Laboratories
Lab Code: MT0010
Sample No.: 030702H004

Customer: MSE / Jay Cornish
Date Analyzed: 07/03/2003

Analyte	Sample Result µg/L	Duplicate Result µg/L	RPD	#	QC Limit
1,1,1-Trichloroethane	0.97	0.94	2.7		20.0
Trichloroethene	1.91	1.73	9.6		20.0
Tetrachloroethene	< 0.50	< 0.50	N/A		20.0

Review

WATER VOLATILE MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY

EPA METHOD 8260B

Project: V Tank

Lab Name: HKM Laboratories
Lab Code: MT0010
Customer: MSE /Jay Cornish
Matrix Spike Sample No.: 0702H004 (10x)
Date Analyzed: 07/02/2003

COMPOUND	SPIKE ADDED (µg/L)	SAMPLE CONCENTRATION (µg/L)	MS CONCENTRATION (µg/L)	MS % REC	#	QC LIMITS REC.
1,1,1-Trichloroethane	10.0	< 1.00	10.87	108.7		70 - 130
Trichloroethene	10.0	1.91	11.40	95.0		70 - 130
Tetrachloroethene	10.0	< 1.00	9.65	96.5		70 - 130

Matrix Spike Sample No.: 0702H004 (10x)

COMPOUND	SPIKE ADDED (µg/L)	MSD CONCENTRATION (µg/L)	MSD % REC.	#	% RPD	#	QC LIMITS RPD	QC LIMITS REC.
1,1,1-Trichloroethane	10.0	10.37	103.7		4.7		20.0	70 - 130
Trichloroethene	10.0	11.97	100.7		5.8		20.0	70 - 130
Tetrachloroethene	10.0	10.09	100.9		4.5		20.0	70 - 130

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

Review

HKM ENGINEERING

Semi-Volatile Organic Compounds
EPA Method 525.2 (Screening)

Extraction Method:	**EPA 3510**
Sample Matrix:	**Aqueous**
Date Reported:	**08/27/2003**
Date Sampled:	**06/30/2003**
Date Received:	**07/01/2003**
Date Analyzed:	**08/19/2003**
Lab Id.:	**030702H005_2**
Sample Id:	**F - 5 - SH**

Client: MSE/Jay Cornish
Project: V Tank

Compound	CAS No.	Result (µg/L)	Qualifier
Biphenyl	156-59-2	< 25.0	U
Bis(2-ethylhexyl) phthalate	79-01-6	1047	
Hexachlorobenzene	127-18-4	118	

Surrogate Report

Compound	Conc. Added (µg/L)	Conc. Found (µg/L)	% Rec.	QC Range
1,3-dimethyl-2-nitrobenzene	5.0	4.70	93.9	70 - 130
Pyrene-d10	5.0	4.65	92.9	70 - 130
Triphenyl phosphate	5.0	4.41	88.1	70 - 130
Perylene-d12	5.0	3.61	72.1	70 - 130

U - compound not detected
J - compound detected, but concentration less than quantitation limit

Review

Water Semi-Volatile Duplicate Report

Method 525.2 (Screening Level)

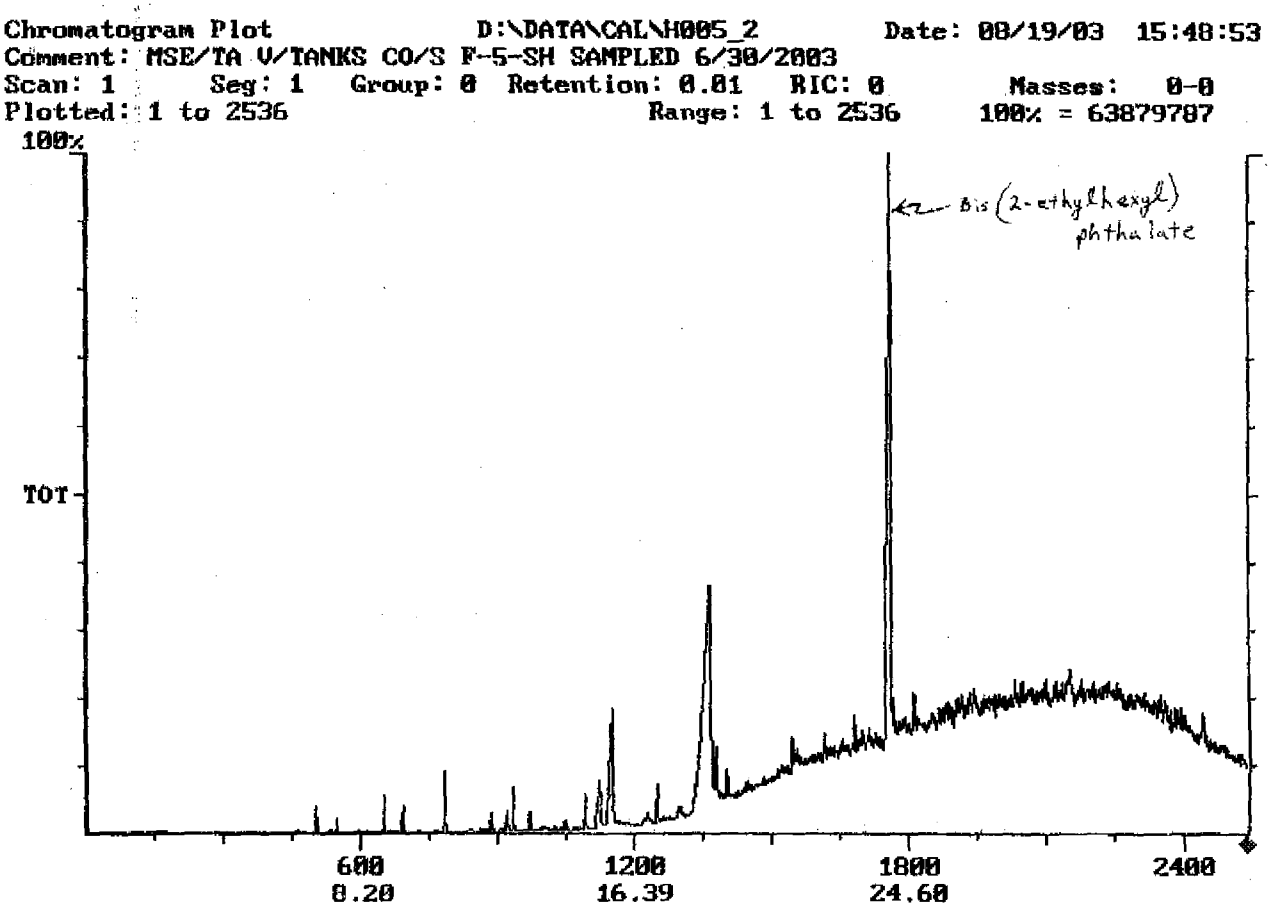
Lab Name: HKM Laboratories **Project:** MSE/ V-Tanks CO/S

Lab Code: MT0010 **Customer:** MSE - Jay Cornish

Sample No.: 030702H005_2 **Date Analyzed:** 08/19/2003

Analyte	Sample Result µg/L	Duplicate Result µg/L	RPD	#	QC Limit
Biphenyl	< 12.50	< 12.50	N/A		20.0
Bis(2-ethylhexyl) phthalate	1046.85	1195.00	13.2		20.0
Hexachlorobenzene	117.60	128.53	8.9		20.0

Review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Comment: MSE/TA V/TANKS CO/S F-5-SH SAMPLED 6/30/2003
Scan: 1 Seg: 1 Group: 0 Retention: 0.01 RIC: 0 Masses: 0-0
Plotted: 1 to 2536 Range: 1 to 2536 100% = 63879787
100%
TOT
Bis (2-ethylhexyl) phthalate
600
8.20
1200
16.39
1800
24.60
2400

HKM ENGINEERING

Semi-Volatile Organic Compounds
Method 525.2 (Screening Level)

Extraction Method:	**EPA 3510**
Sample Matrix:	**Aqueous**
Date Reported:	**08/27/2003**
Date Sampled:	**NA**
Date Received:	**NA**
Date Analyzed:	**08/19/2003**
Lab Id.:	**0819LCS1**

Client: **MSE/Jay Cornish**
Project: **V Tank**

Sample Id: **Laboratory Control Sample**

Compound	Conc. Added (µg/L)	Conc. Found (µg/L)	% Rec.	QC Range
Biphenyl	5.0	5.77	115.4	70 - 130
Bis(2-ethylhexyl) phthalate	5.0	4.56	91.1	70 - 130
Hexachlorobenzene	10.0	9.67	96.7	70 - 130

Surrogate Report

Compound	Conc. Added (µg/L)	Conc. Found (µg/L)	% Rec.	QC Range
1,3-dimethyl-2-nitrobenzene	5.0	4.94	98.9	70 - 130
Pyrene-d10	5.0	4.97	99.5	70 - 130
Triphenyl phosphate	5.0	4.64	92.7	70 - 130
Perylene-d12	5.0	4.43	88.6	70 - 130

U - compound not detected
J - compound detected, but concentration less than quantitation limit

Review

HKM ENGINEERING

Semi-Volatile Organic Compounds
Method 525.2 (Screening Level)

Extraction Method:	**EPA 3510**
Sample Matrix:	**Aqueous**
Date Reported:	**08/27/2003**
Date Sampled:	**NA**
Date Received:	**NA**
Date Analyzed:	**08/19/2003**
Lab Id.:	**0819EXB1**
Sample Id:	**Extraction Blank**

Client: MSE/Jay Cornish
Project: V Tank

Compound	CAS No.	Result (µg/L)	Qualifier
Biphenyl	156-59-2	< 1.0	U
Bis(2-ethylhexyl) phthalate	79-01-6	< 1.0	U
Hexachlorobenzene	127-18-4	< 1.0	U

Surrogate Report

Compound	Conc. Added (µg/L)	Conc. Found (µg/L)	% Rec.	QC Range
1,3-dimethyl-2-nitrobenzene	5.0	4.75	95.0	70 - 130
Pyrene-d10	5.0	4.95	99.0	70 - 130
Triphenyl phosphate	5.0	4.66	93.2	70 - 130
Perylene-d12	5.0	2.54	50.7	70 - 130

U - compound not detected
J - compound detected, but concentration less than quantitation limit

Review

HKM ENGINEERING

Volatile Organic Compounds
EPA Method 8260B

Client: MSE/Jay Comish
Project: V Tank

Extraction Method: EPA 5030
Sample Matrix: Water
Date Reported: 08/21/2003
Date Sampled: 07/24/2003
Date Received: 07/25/2003
Date Analyzed: 08/06/2003
Lab Id.: 030725J003
Sample Id: F9VH-1
Dilution: 160X

Compound	CAS No.	Result (µg/L)	Qualifier
1,1,1-Trichloroethane	156-59-2	< 160	4.5 J
Trichloroethene	79-01-6	< 160	52.2 J
Tetrachloroethene	127-18-4	< 160	7.7 J

Compound	(µg/L)	(µg/L)	% Rec.	Range
Dibromofluoromethane	10.0	9.20	92.0	80 - 120
1,2-Dichloroethane-d_4	10.0	8.52	85.2	80 - 120
Toluene-d_8	10.0	9.59	95.9	80 - 120
4-Bromofluorobenzene	10.0	9.07	90.7	80 - 120

Note: **Sample run at 160x dilution; results corrected for dilution.**

U - compound not detected
J - compound detected, but concentration less than quantitation limit

CPW
Review

HKM ENGINEERING

Volatile Organic Compounds
EPA Method 8260B

Client: MSE/Jay Cornish
Project: V Tank

Extraction Method:	EPA 5030
Sample Matrix:	Water
Date Reported:	08/21/2003
Date Sampled:	07/24/2003
Date Received:	07/25/2003
Date Analyzed:	08/06/2003
Lab Id.:	030725J004
Sample Id:	F9VH-2
Dilution:	160X

Compound	CAS No.	Result (µg/L)	Qualifier
1,1,1-Trichloroethane	156-59-2	< 160	4.5 J
Trichloroethene	79-01-6	< 160	69.2 J
Tetrachloroethene	127-18-4	< 160	9.6 J

Surrogate Report

Compound	Conc. Added (µg/L)	Conc. Found (µg/L)	% Rec.	QC Range
Dibromofluoromethane	10.0	9.59	95.9	80 - 120
1,2-Dichloroethane-d_4	10.0	9.48	94.8	80 - 120
Toluene-d_8	10.0	10.43	104.3	80 - 120
4-Bromofluorobenzene	10.0	9.25	92.5	80 - 120

Note: **Sample run at 160x dilution; results corrected for dilution.**

U - compound not detected
J - compound detected, but concentration less than quantitation limit

Review

HKM ENGINEERING

Volatile Organic Compounds
EPA Method 8260B

Client: MSE/Jay Cornish
Project: V Tank

Extraction Method:	EPA 5030
Sample Matrix:	Water
Date Reported:	08/21/2003
Date Sampled:	07/24/2003
Date Received:	07/25/2003
Date Analyzed:	08/08/2003
Lab Id.:	030725J005
Sample Id:	F8-V8
Dilution:	10X

Compound	CAS No.	Result (µg/L)	Qualifier
1,1,1-Trichloroethane	156-59-2	< 10.0	2.3 J
Trichloroethene	79-01-6	33.3	
Tetrachloroethene	127-18-4	< 10.0	3.8 J

Surrogate Report

Compound	Conc. Added (µg/L)	Conc. Found (µg/L)	% Rec.	QC Range
Dibromofluoromethane	10.0	10.02	100.2	80 - 120
1,2-Dichloroethane-d_4	10.0	9.67	96.7	80 - 120
Toluene-d_8	10.0	10.54	105.4	80 - 120
4-Bromofluorobenzene	10.0	10.07	100.7	80 - 120

Note: **Sample run at 10x dilution; results corrected for dilution.**

U - compound not detected
J - compound detected, but concentration less than quantitation limit

C.P.J
Review

HKM ENGINEERING

Volatile Organic Compounds
EPA Method 8260B

Date Reported: 08/13/2003

Extraction Method: EPA 5030
Date Analyzed: 08/06/2003
Sample Matrix: Water

Laboratory Control Sample

Method 8260B

Client: MSE/Jay Cornish
Project: V Tank
Description: 0806LCS1

Compound	Conc. Added (µg/L)	Conc. Found (µg/L)	% Rec.	QC Range
1,1,1-Trichloroethane	10.0	9.31	93.1	70-130
Trichloroethene	10.0	9.41	94.1	70-130
Tetrachloroethene	10.0	10.09	100.9	70-130

Surrogate Report

Compound	Conc. Added (µg/L)	Conc. Found (µg/L)	% Rec.	QC Range
Dibromofluoromethane	10.0	10.30	103.0	80 - 120
1,2-Dichloroethane-d_4	10.0	9.86	98.6	80 - 120
Tolune-d_8	10.0	10.36	103.6	80 - 120
4-Bromofluorobenzene	10.0	9.70	97.0	80 - 120

Review

HKM ENGINEERING

Volatile Organic Compounds
EPA Method 8260B

Date Reported: 08/18/2003

Extraction Method: EPA 5030
Date Analyzed: 08/08/2003
Sample Matrix: Water

Laboratory Control Sample

Method 8260B

Client: MSE/ TA Jay Cornish
Project: V Tank
Description: 0807LCS1

Compound	Conc. Added (µg/L)	Conc. Found (µg/L)	% Rec.	QC Range
1,1,1-Trichloroethane	10.0	8.10	81.0	70-130
Trichloroethene	10.0	8.32	83.2	70-130
Tetrachloroethene	10.0	9.17	91.7	70-130

Surrogate Report

Compound	Conc. Added (µg/L)	Conc. Found (µg/L)	% Rec.	QC Range
Dibromofluoromethane	10.0	9.93	99.3	80 - 120
1,2-Dichloroethane-d_4	10.0	9.62	96.2	80 - 120
Toluene-d_8	10.0	10.61	106.1	80 - 120
4-Bromofluorobenzene	10.0	10.72	107.2	80 - 120

Review

HKM ENGINEERING

Volatile Organic Compounds
EPA Method 8260B

Laboratory Reagent Blank

Method 8260B

Extraction Method: EPA 5030
Sample Matrix: Water
Date Reported: 08/18/2003
Date Sampled: N/A
Date Received: N/A
Date Analyzed: 08/08/2003

Client: MSE/TA Jay Cornish
Project: V-Tank
Lab Id.: 0807LRB1

Compound	CAS No.	Result (µg/L)	Qualifier
1,1,1-Trichloroethane	156-59-2	< 1.0	U
Trichloroethene	79-01-6	< 1.0	U
Tetrachloroethene	127-18-4	< 1.0	U

Surrogate Report

Compound	Conc. Added (µg/L)	Conc. Found (µg/L)	% Rec.	QC Range
Dibromofluoromethane	10.0	10.13	101.3	80 - 120
1,2-Dichloroethane-d_4	10.0	9.67	96.7	80 - 120
Toluene-d_8	10.0	11.04	110.4	80 - 120
4-Bromofluorobenzene	10.0	9.87	98.7	80 - 120

U - compound not detected
J - compound detected, but concentration less than quantitation limit

Review

HKM ENGINEERING

03-Sep-03 4:14 pm

Client: MSE/TA-V TANK CO/S
BIF: 010823

Sample ID	Collected Date	Customer's Sample ID	Chloride (mg/L)
030806K001	08/01/2003	F12 VH	565
030806K002	08/01/2003	F12 CIH	33.0
030806K003	08/01/2003	F9A VH	810
030806K004	08/01/2003	F9A CIH	48.0

Review

HKM ENGINEERING

Client: MSE/TA - Jay Cornish
Project: V Tank

Volatile Organic Compounds
EPA Method 8260B

Extraction Method:	**EPA 5030**
Sample Matrix:	**Water**
Date Reported:	**09/03/2003**
Date Sampled:	**08/01/2003**
Date Received:	**08/01/2003**
Date Analyzed:	**08/15/2003**
Lab Id.:	**030806K005**
Sample Id:	**F12 (GC)**
Dilution:	**20X**
	250uL/5ml

Compound	CAS No.	Result (µg/L)	Qualifier
1,1,1-Trichloroethane	156-59-2	< 20	11.4 J
Trichloroethene	79-01-6	379	
Tetrachloroethene	127-18-4	42	

Surrogate Report

Compound	Conc. Added (µg/L)	Conc. Found (µg/L)	% Rec.	QC Range
Dibromofluoromethane	10.0	9.59	95.9	80 - 120
1,2-Dichloroethane-d_4	10.0	9.14	91.4	80 - 120
Toluene-d_8	10.0	10.61	106.1	80 - 120
4-Bromofluorobenzene	10.0	9.44	94.4	80 - 120

Note: **Sample run at 20x dilution; results corrected for dilution.**

U - compound not detected
J - compound detected, but concentration less than quantitation limit

GFW
Review

HKM ENGINEERING

Client: MSE/TA - Jay Cornish
Project: V Tank

Volatile Organic Compounds
EPA Method 8260B

Extraction Method: EPA 5030
Sample Matrix: Water
Date Reported: 09/03/2003
Date Sampled: 08/01/2003
Date Received: 08/01/2003
Date Analyzed: 08/15/2003
Lab Id.: 030806K006
Sample Id: F9A (GC)
Dilution: 20X
250uL/5ml

Compound	CAS No.	Result (µg/L)	Qualifier
1,1,1-Trichloroethane	156-59-2	85.2	
Trichloroethene	79-01-6	454	
Tetrachloroethene	127-18-4	31.7	

Surrogate Report

Compound	Conc. Added (µg/L)	Conc. Found (µg/L)	% Rec.	QC Range
Dibromofluoromethane	10.0	8.96	89.6	80 - 120
1,2-Dichloroethane-d_4	10.0	8.81	88.1	80 - 120
Toluene-d_8	10.0	10.00	100.0	80 - 120
4-Bromofluorobenzene	10.0	9.75	97.5	80 - 120

Note: Sample run at 20x dilution; results corrected for dilution.

U - compound not detected
J - compound detected, but concentration less than quantitation limit

Review

HKM ENGINEERING

Volatile Organic Compounds
EPA Method 8260B

Date Reported: 09/03/2003

Extraction Method: EPA 5030
Date Analyzed: 08/15/2003
Sample Matrix: Water

Laboratory Control Sample

Method 8260B

Client: MSE/TA - Jay Cornish
Project: V Tank
Description: 0815LCS1

Compound	Conc. Added (µg/L)	Conc. Found (µg/L)	% Rec.	QC Range
1,1,1-Trichloroethane	10.0	8.19	81.9	70-130
Trichloroethene	10.0	8.80	88.0	70-130
Tetrachloroethene	10.0	8.76	87.6	70-130

Review

HKM ENGINEERING

03-Sep-03 10:54 am

Client: MSE/TA-V TANK CO/S
BIF: 010843

Sample ID	Collected Date	Customer's Sample ID	Chloride (mg/L)
030812O001	08/07/2003	F6-CLH	3600
030812O002	08/06/2003	F10-CLH	42.0

Review

HKM ENGINEERING

Volatile Organic Compounds
EPA Method 8260B

Client: MSE/Jay Cornish
Project: V Tank

Extraction Method:	EPA 5030
Sample Matrix:	Water
Date Reported:	09/03/2003
Date Sampled:	08/06/2003
Date Received:	08/15/2003
Date Analyzed:	08/20/2003
Lab Id.:	030818O001
Sample Id:	F10-1
Dilution:	20X
	250uL/5ml

Compound	CAS No.	Result (µg/L)	Qualifier
1,1,1-Trichloroethane	156-59-2	< 20.0	16.5 J
Trichloroethene	79-01-6	177	
Tetrachloroethene	127-18-4	32.0	

Surrogate Report

Compound	Conc. Added (µg/L)	Conc. Found (µg/L)	% Rec.	QC Range
Dibromofluoromethane	10.0	9.42	94.2	80 - 120
1,2-Dichloroethane-d_4	10.0	9.52	95.2	80 - 120
Toluene-d_8	10.0	10.07	100.7	80 - 120
4-Bromofluorobenzene	10.0	10.33	103.3	80 - 120

Note: **Sample run at 20x dilution; results corrected for dilution.**

U - compound not detected
J - compound detected, but concentration less than quantitation limit

Review

HKM ENGINEERING

Client: MSE/Jay Cornish
Project: V Tank

Volatile Organic Compounds
EPA Method 8260B

Extraction Method:	EPA 5030
Sample Matrix:	Water
Date Reported:	09/03/2003
Date Sampled:	08/06/2003
Date Received:	08/15/2003
Date Analyzed:	08/20/2003
Lab Id.:	030818O002
Sample Id:	F10-2
Dilution:	38.5X
	130uL/5ml

Compound	CAS No.	Result (µg/L)	Qualifier
1,1,1-Trichloroethane	156-59-2	43.5	
Trichloroethene	79-01-6	150	
Tetrachloroethene	127-18-4	< 38.5	27.9 J

Surrogate Report

Compound	Conc. Added (µg/L)	Conc. Found (µg/L)	% Rec.	QC Range
Dibromofluoromethane	10.0	9.46	94.6	80 - 120
1,2-Dichloroethane-d_4	10.0	8.98	89.8	80 - 120
Toluene-d_8	10.0	10.14	101.4	80 - 120
4-Bromofluorobenzene	10.0	10.09	100.9	80 - 120

Note: **Sample run at 34.5x dilution; results corrected for dilution.**

U - compound not detected
J - compound detected, but concentration less than quantitation limit

Review

HKM ENGINEERING

Volatile Organic Compounds
EPA Method 8260B

Compound	CAS No.	(µg/L)	Qualifier
1,1,1-Trichloroethane	156-59-2	35.1	
Trichloroethene	79-01-6	774	
Tetrachloroethene	127-18-4	365	

Surrogate Report

Compound	Conc. Added (µg/L)	Conc. Found (µg/L)	% Rec.	QC Range
Dibromofluoromethane	10.0	10.11	101.1	80 - 120
1,2-Dichloroethane-d_4	10.0	9.50	95.0	80 - 120
Toluene-d_8	10.0	11.04	110.4	80 - 120
4-Bromofluorobenzene	10.0	9.57	95.7	80 - 120

Note: **Sample run at 10x dilution; results corrected for dilution.**

U - compound not detected
J - compound detected, but concentration less than quantitation limit

Review

HKM ENGINEERING

Volatile Organic Compounds
EPA Method 8260B

Client: MSE/Jay Comish
Project: V Tank

Extraction Method:	EPA 5030
Sample Matrix:	Water
Date Reported:	09/03/2003
Date Sampled:	08/06/2003
Date Received:	08/07/2003
Date Analyzed:	08/20/2003
Lab Id.:	030812O004
Sample Id:	F10-VH
Dilution:	10X

Compound	CAS No.	Result (µg/L)	Qualifier
1,1,1-Trichloroethane	156-59-2	< 10.0	3.6 J
Trichloroethene	79-01-6	23.2	
Tetrachloroethene	127-18-4	< 10.0	5.9 J

Surrogate Report

Compound	Conc. Added (µg/L)	Conc. Found (µg/L)	% Rec.	QC Range
Dibromofluoromethane	10.0	9.05	90.5	80 - 120
1,2-Dichloroethane-d_4	10.0	8.95	89.5	80 - 120
Toluene-d_8	10.0	9.73	97.3	80 - 120
4-Bromofluorobenzene	10.0	10.04	100.4	80 - 120

Note: **Sample run at 10x dilution; results corrected for dilution.**

U - compound not detected
J - compound detected, but concentration less than quantitation limit

Review

WATER VOLATILE MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY

EPA METHOD 8260B

Project: V Tank

Lab Name: HKM Laboratories
Lab Code: MT0010
Matrix Spike Sample No.: 030812O004

Customer: MSE / Jay Cornish

Date Analyzed: 08/20/2003

COMPOUND	SPIKE ADDED (µg/L)	SAMPLE CONCENTRATION (µg/L)	MS CONCENTRATION (µg/L)	MS % REC	#	QC LIMITS REC.
1,1,1-Trichloroethane	10.0	< 1.00	9.33	93.3		70 - 130
Trichloroethene	10.0	2.32	11.12	88.0		70 - 130
Tetrachloroethene	10.0	< 1.00	9.44	94.4		70 - 130

Matrix Spike Sample No.: 030812O004

COMPOUND	SPIKE ADDED (µg/L)	MSD CONCENTRATION (µg/L)	MSD % REC.	#	% RPD	#	QC LIMITS RPD	QC LIMITS REC.
1,1,1-Trichloroethane	10.0	10.08	100.8		7.8		20.0	70 - 130
Trichloroethene	10.0	12.25	99.3		12.1		20.0	70 - 130
Tetrachloroethene	10.0	10.43	104.3		10.0		20.0	70 - 130

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

Review

Water Volatile Duplicate Report

Method 8260B

Project: V Tank

Lab Name: HKM Laboratories
Lab Code: MT0010
Sample No.: 030812O004

Customer: MSE / Jay Cornish

Date Analyzed: 08/20/2003

Analyte	Sample Result ug/L	Duplicate Result ug/L	RPD	#	QC Limit
1,1,1-Trichloroethane	< 1.00	< 1.00	N/A		20.0
Trichloroethene	2.32	2.35	1.2		20.0
Tetrachloroethene	< 1.00	< 1.00	N/A		20.0

Review

HKM ENGINEERING

Volatile Organic Compounds
EPA Method 8260B

Date Reported: 09/03/2003

Extraction Method: EPA 5030
Date Analyzed: 08/20/2003
Sample Matrix: Water

Laboratory Control Sample

Method 8260B

Client: MSE/ TA Jay Cornish
Project: V Tank
Description: 0820LCS1

Compound	Conc. Added (µg/L)	Conc. Found (µg/L)	% Rec.	QC Range
1,1,1-Trichloroethane	10.0	9.49	94.9	70-130
Trichloroethene	10.0	10.12	101.2	70-130
Tetrachloroethene	10.0	10.21	102.1	70-130

Surrogate Report

Compound	Conc. Added (µg/L)	Conc. Found (µg/L)	% Rec.	QC Range
Dibromofluoromethane	10.0	9.58	95.8	80 - 120
1,2-Dichloroethane-d_4	10.0	8.74	87.4	80 - 120
Toluene-d_8	10.0	10.09	100.9	80 - 120
4-Bromofluorobenzene	10.0	9.64	96.4	80 - 120

Review

HKM ENGINEERING

Volatile Organic Compounds
EPA Method 8260B

Laboratory Reagent Blank

Method 8260B

Extraction Method: EPA 5035
Sample Matrix: Water
Date Reported: 09/02/2003
Date Sampled: N/A
Date Received: N/A
Date Analyzed: 08/20/2003

Client: MSE/ Jay Cornish
Project: V Tank
Lab Id.: 0820LRB1

Compound	CAS No.	Result (µg/L)	Qualifier
1,1,1-Trichloroethane	156-59-2	< 1.0	U
Trichloroethene	79-01-6	< 1.0	U
Tetrachloroethene	127-18-4	< 1.0	U

Surrogate Report

Compound	Conc. Added (µg/L)	Conc. Found (µg/L)	% Rec.	QC Range
Dibromofluoromethane	10.0	9.64	96.4	80 - 120
1,2-Dichloroethane-d_4	10.0	10.40	104.0	80 - 120
Toluene-d_8	10.0	10.80	108.0	80 - 120
4-Bromofluorobenzene	10.0	10.23	102.3	80 - 120

U - compound not detected
J - compound detected, but concentration less than quantitation limit

(GTJ)
Review

HKM ENGINEERING

25-Sep-03 2:38 pm

Client: MSE/TA-V TANK CO/S
BIF: 010927

Sample ID	Collected Date	Customer's Sample ID	Chloride (mg/L)	Oil-Grease (mg/L)
030828J005	08/19/2003	F-16HCl	49.0	
030828J006	08/21/2003	F-21CIH	67.0	
030828J007	08/19/2003	OGS-H		8290
030828J008	08/19/2003	F16-OGH		1080
030828J009	08/21/2003	F21-OGH		2740

Review

HKM ENGINEERING

Client: MSE/TA - Jay Cornish
Project: V Tank

Volatile Organic Compounds
EPA Method 8260B

Extraction Method:	EPA 5030
Sample Matrix:	Water
Date Reported:	09/03/2003
Date Sampled:	08/16/2003
Date Received:	08/21/2003
Date Analyzed:	08/29/2003
Lab Id.:	030828J001
Sample Id:	F-20DV
Dilution:	20X
	250uL/5ml

Compound	CAS No.	Result (µg/L)	Qualifier
1,1,1-Trichloroethane	156-59-2	214	J
Trichloroethene	79-01-6	203	J
Tetrachloroethene	127-18-4	< 20.0	19.9 J

Surrogate Report

Compound	Conc. Added (µg/L)	Conc. Found (µg/L)	% Rec.	QC Range
Dibromofluoromethane	10.0	NA	NC	80 - 120
1,2-Dichloroethane-d_4	10.0	NA	NC	80 - 120
Toluene-d_8	10.0	NA	NC	80 - 120
4-Bromofluorobenzene	10.0	NA	NC	80 - 120

Note: - Sample run at 20x dilution; results corrected for dilution.
- all values estimated, internal standards and surrogates accidentally omitted

U - compound not detected
J - compound detected, but concentration less than quantitation limit
NA - surrogate not added
NC - result not calculated

CdFW
Review

Volatile Organic Compounds
EPA Method 8260B

Client: MSE/TA - Jay Cornish
Project: V Tank

Extraction Method:	**EPA 5030**
Sample Matrix:	**Water**
Date Reported:	**09/03/2003**
Date Sampled:	**08/19/2003**
Date Received:	**08/21/2003**
Date Analyzed:	**08/29/2003**
Lab Id.:	**030828J002**
Sample Id:	**F-16DV**
Dilution:	**20X**
	250uL/5ml

Compound	CAS No.	Result (µg/L)	Qualifier
1,1,1-Trichloroethane	156-59-2	49.9	
Trichloroethene	79-01-6	241	
Tetrachloroethene	127-18-4	86.2	

Surrogate Report

Compound	Conc. Added (µg/L)	Conc. Found (µg/L)	% Rec.	QC Range
Dibromofluoromethane	10.0	9.28	92.8	80 - 120
1,2-Dichloroethane-d_4	10.0	8.66	86.6	80 - 120
Toluene-d_8	10.0	9.95	99.5	80 - 120
4-Bromofluorobenzene	10.0	9.48	94.8	80 - 120

Note: **Sample run at 20x dilution; results corrected for dilution.**

U - compound not detected
J - compound detected, but concentration less than quantitation limit

GFW
Review

HKM ENGINEERING

Client: MSE/TA - Jay Cornish
Project: V Tank

Volatile Organic Compounds
EPA Method 8260B

Extraction Method:	EPA 5030
Sample Matrix:	Water
Date Reported:	09/03/2003
Date Sampled:	08/21/2003
Date Received:	08/21/2003
Date Analyzed:	08/29/2003
Lab Id.:	030828J003
Sample Id:	F-16VH
Dilution:	10X

Compound	CAS No.	Result (µg/L)	Qualifier
1,1,1-Trichloroethane	156-59-2	< 10.0	2.84 J
Trichloroethene	79-01-6	< 10.0	6.95 J
Tetrachloroethene	127-18-4	< 10.0	2.70 J

Surrogate Report

Compound	Conc. Added (µg/L)	Conc. Found (µg/L)	% Rec.	QC Range
Dibromofluoromethane	10.0	9.51	95.1	80 - 120
1,2-Dichloroethane-d_4	10.0	9.19	91.9	80 - 120
Toluene-d_8	10.0	10.38	103.8	80 - 120
4-Bromofluorobenzene	10.0	9.56	95.6	80 - 120

Note: **Sample run at 10x dilution; results corrected for dilution.**

U - compound not detected
J - compound detected, but concentration less than quantitation limit

GFW
Review

Client: MSE/TA - Jay Cornish
Project: V Tank

Volatile Organic Compounds
EPA Method 8260B

Extraction Method:	EPA 5030
Sample Matrix:	Water
Date Reported:	09/03/2003
Date Sampled:	08/21/2003
Date Received:	08/21/2003
Date Analyzed:	08/29/2003
Lab Id.:	030828J004
Sample Id:	F-21DV
Dilution:	20X
	250uL/5ml

Compound	CAS No.	Result (µg/L)		Qualifier
1,1,1-Trichloroethane	156-59-2	67.0		
1,2-Dichloroethane-d_4	10.0	9.66	96.6	80 - 120
Toluene-d_8	10.0	10.33	103.3	80 - 120
4-Bromofluorobenzene	10.0	9.60	96.0	80 - 120

WATER VOLATILE MATRIX SPIKE / MATRIX SPIKE DUPLICATE RECOVERY

EPA METHOD 8260B

Project: V Tank

Lab Name: HKM Laboratories
Lab Code: MT0010
Customer: MSE/TA - Jay Cornish
Matrix Spike Sample No.: 010522K017
Date Analyzed: 08/29/2003

COMPOUND	SPIKE ADDED (µg/L)	SAMPLE CONCENTRATION (µg/L)	MS CONCENTRATION (µg/L)	MS % REC	#	QC LIMITS REC.
1,1,1-Trichloroethane	10.0	< 1.00	8.68	86.8		70 - 130
Trichloroethene	10.0	< 1.00	9.55	95.5		70 - 130
Tetrachloroethene	10.0	< 1.00	9.12	91.2		70 - 130

Matrix Spike Sample No.: 010522K017

COMPOUND	SPIKE ADDED (µg/L)	MSD CONCENTRATION (µg/L)	MSD % REC.	#	% RPD	#	QC LIMITS RPD	QC LIMITS REC.
1,1,1-Trichloroethane	10.0	9.65	96.5		10.6		20.0	70 - 130
Trichloroethene	10.0	10.06	100.6		5.2		20.0	70 - 130
Tetrachloroethene	10.0	9.55	95.5		4.6		20.0	70 - 130

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

Review

Water Volatile Duplicate Report

Method 8260B

Project: V Tank

Lab Name: HKM Laboratories
Lab Code: MT0010
Sample No.: 030828J003

Customer: MSE/TA - Jay Cornish
Date Analyzed: 08/29/2003

Analyte	Sample Result µg/L	Duplicate Result µg/L	RPD	#	QC Limit
1,1,1-Trichloroethane	0.28	0.29	1.7		20.0
Trichloroethene	0.70	0.68	2.8		20.0
Tetrachloroethene	0.27	0.26	2.6		20.0

CofW
Review

HKM ENGINEERING

Volatile Organic Compounds
EPA Method 8260B

Laboratory Reagent Blank

Method 8260B

Extraction Method: EPA 5035
Sample Matrix: Water
Date Reported: 09/05/2003
Date Sampled: N/A
Date Received: N/A
Date Analyzed: 08/29/2003

Client: MSE/TA Jay Cornish
Project: V Tank
Lab Id.: 0829LRB3

Compound	CAS No.	Result (µg/L)	Qualifier
1,1,1-Trichloroethane	156-59-2	< 1.0	U
Trichloroethene	79-01-6	< 1.0	U
Tetrachloroethene	127-18-4	< 1.0	U

Surrogate Report

Compound	Conc. Added (µg/L)	Conc. Found (µg/L)	% Rec.	QC Range
Dibromofluoromethane	10.0	9.52	95.2	80 - 120
1,2-Dichloroethane-d_4	10.0	9.44	94.4	80 - 120
Toluene-d_8	10.0	10.38	103.8	80 - 120
4-Bromofluorobenzene	10.0	9.97	99.7	80 - 120

U - compound not detected
J - compound detected, but concentration less than quantitation limit

CFU
Review

HKM ENGINEERING

Volatile Organic Compounds
EPA Method 8260B

Date Reported: 09/05/2003

Extraction Method: EPA 5030
Date Analyzed: 08/29/2003
Sample Matrix: Water

Laboratory Control Sample

Method 8260B

Client: MSE/TA - Jay Cornish
Project: V Tank
Description: 0829LCS2

Compound	Conc. Added (µg/L)	Conc. Found (µg/L)	% Rec.	QC Range
1,1,1-Trichloroethane	10.0	8.82	88.2	70-130
Trichloroethene	10.0	9.44	94.4	70-130
Tetrachloroethene	10.0	9.71	97.1	70-130
Surrogate Report				
Compound	**Conc. Added (µg/L)**	**Conc. Found (µg/L)**	**% Rec.**	**QC Range**
Dibromofluoromethane	10.0	9.40	94.0	80 - 120
1,2-Dichloroethane-d_4	10.0	9.07	90.7	80 - 120
Toluene-d_8	10.0	9.68	96.8	80 - 120
4-Bromofluorobenzene	10.0	10.27	102.7	80 - 120

Review

Appendix F

Photographs

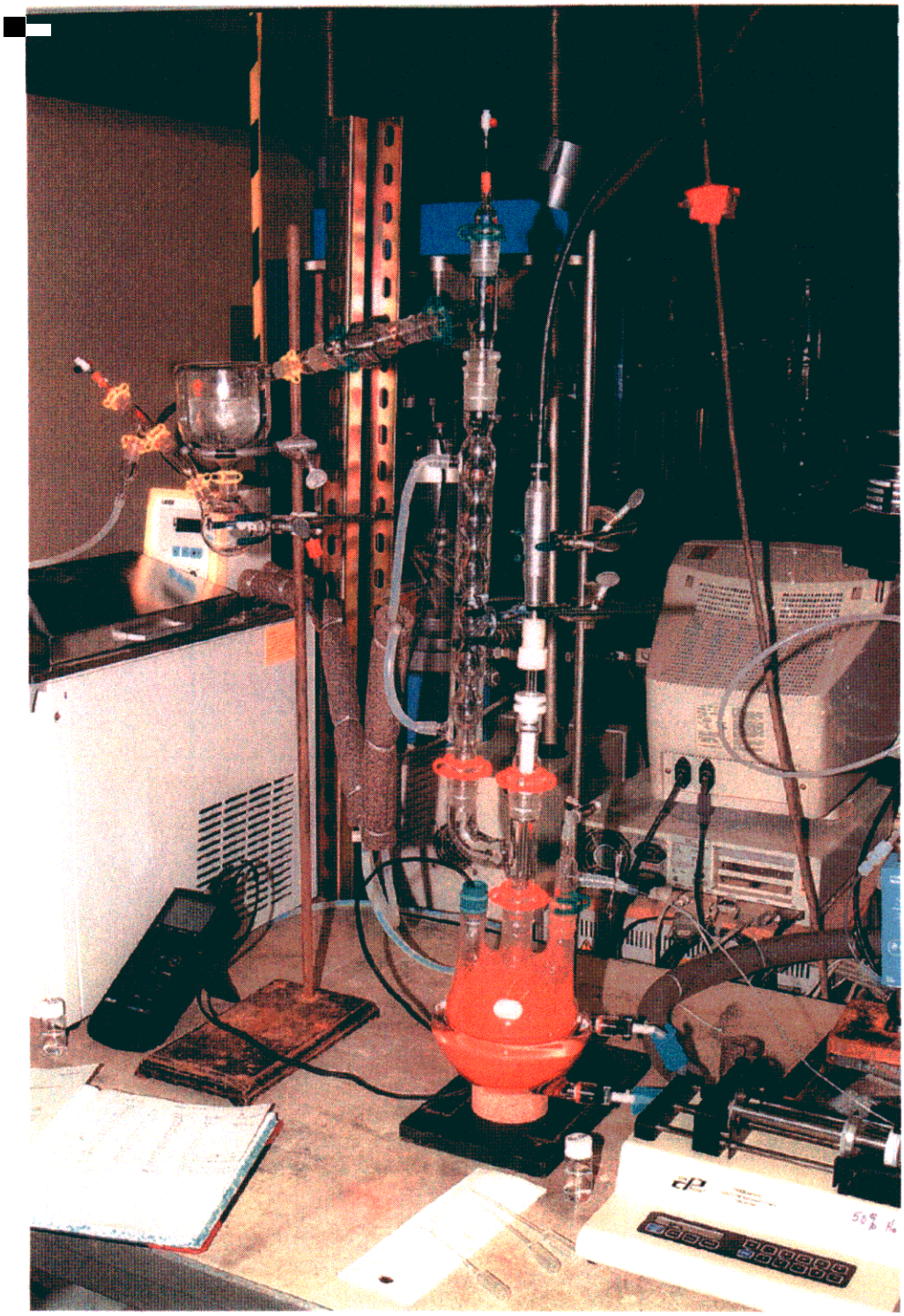

Figure F-1. Photograph of test apparatus.

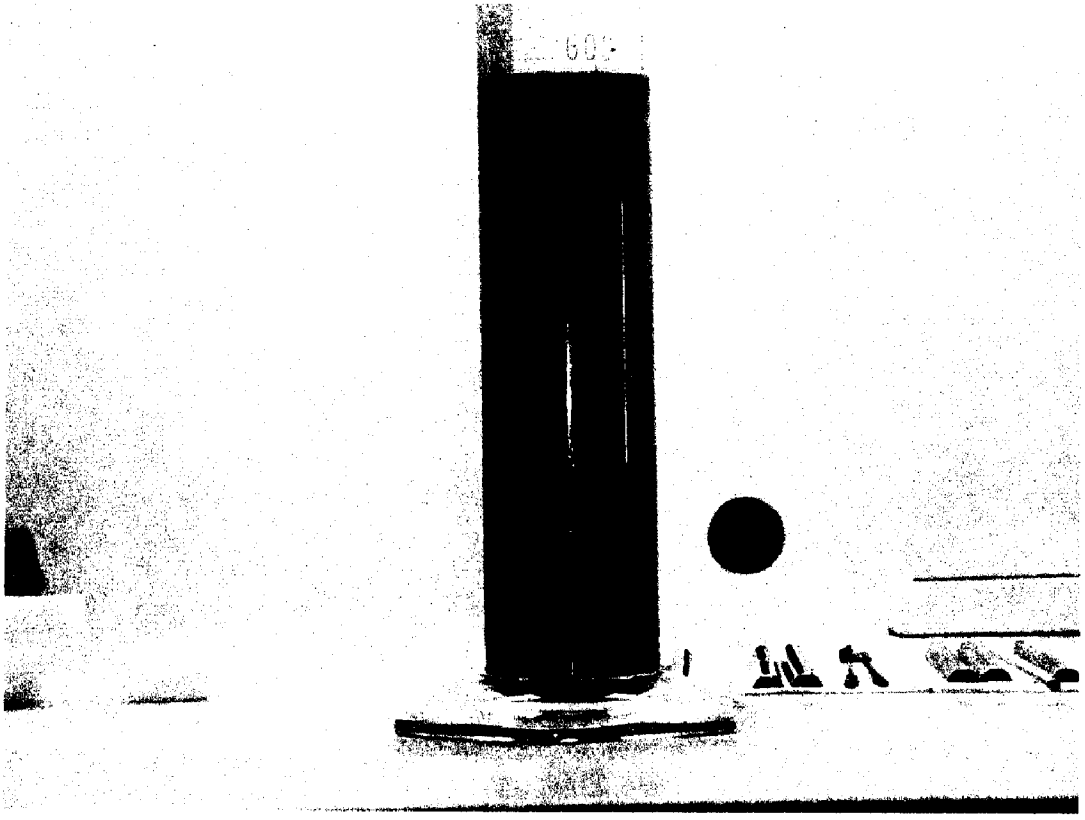

Figure F-2. Photograph of sample from test F-16.

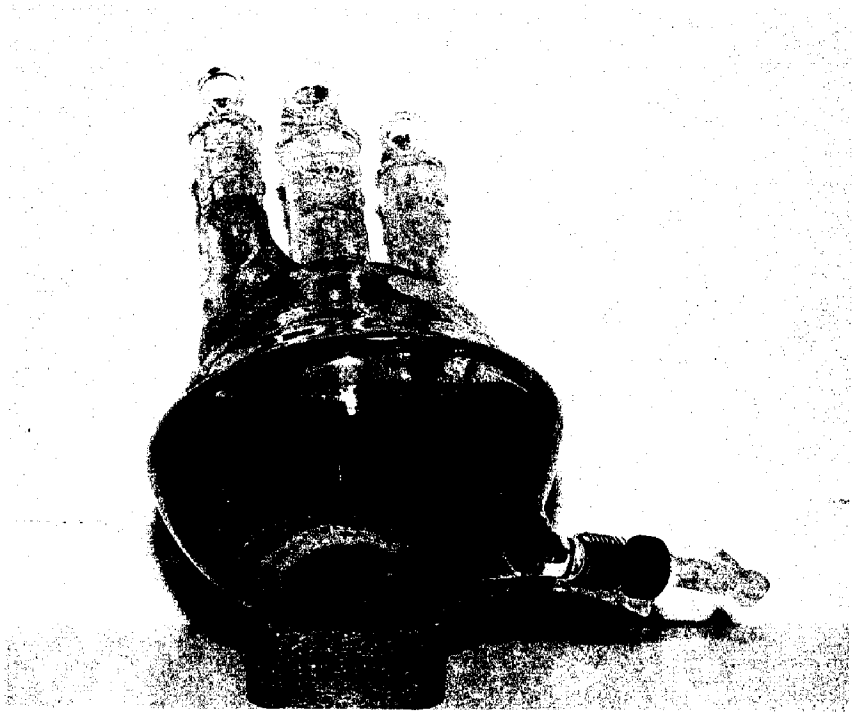

Figure F-3. Photograph of sample from test F-22.

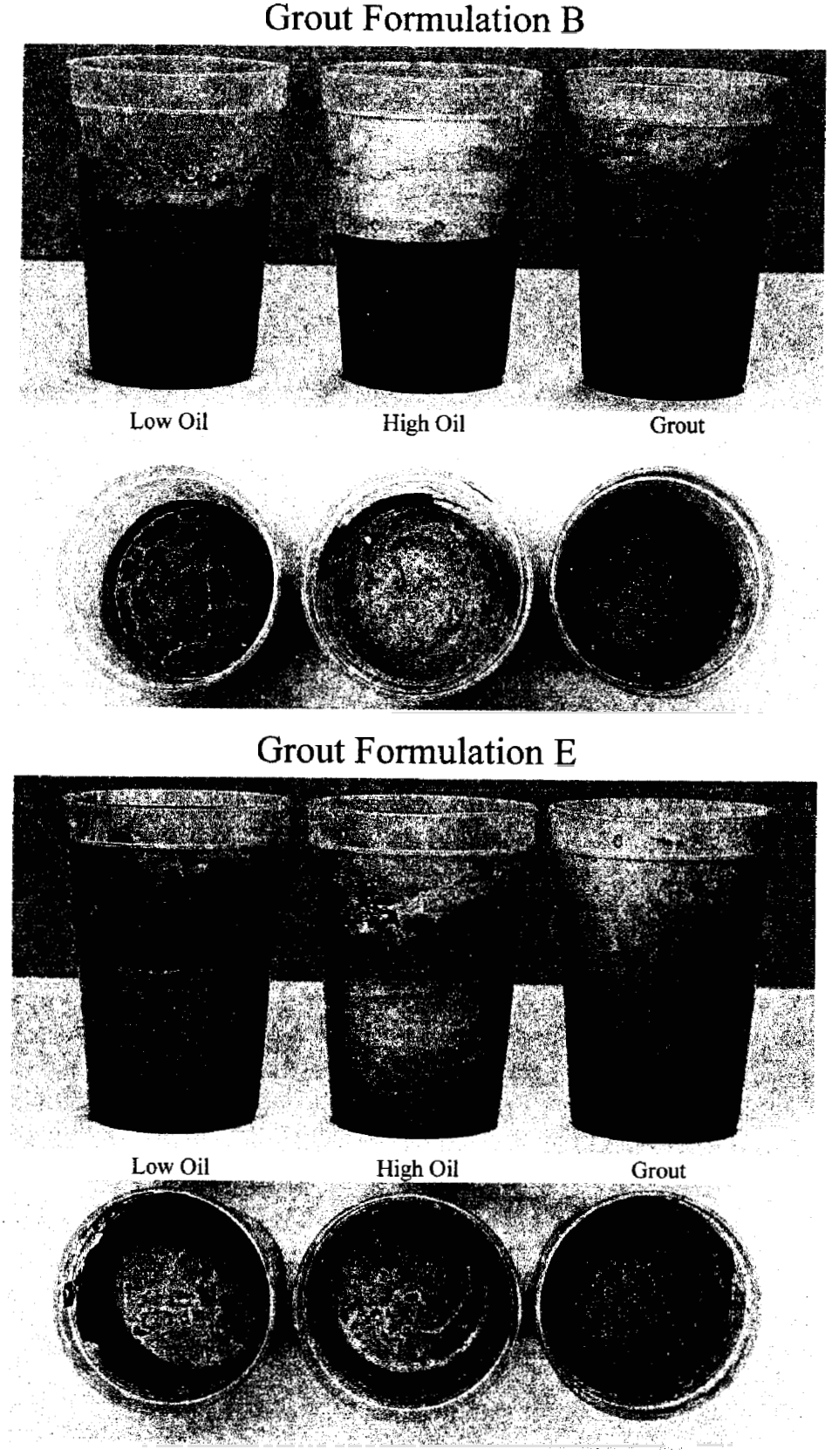

Figure F-4. Photographs of Grout Formulation.

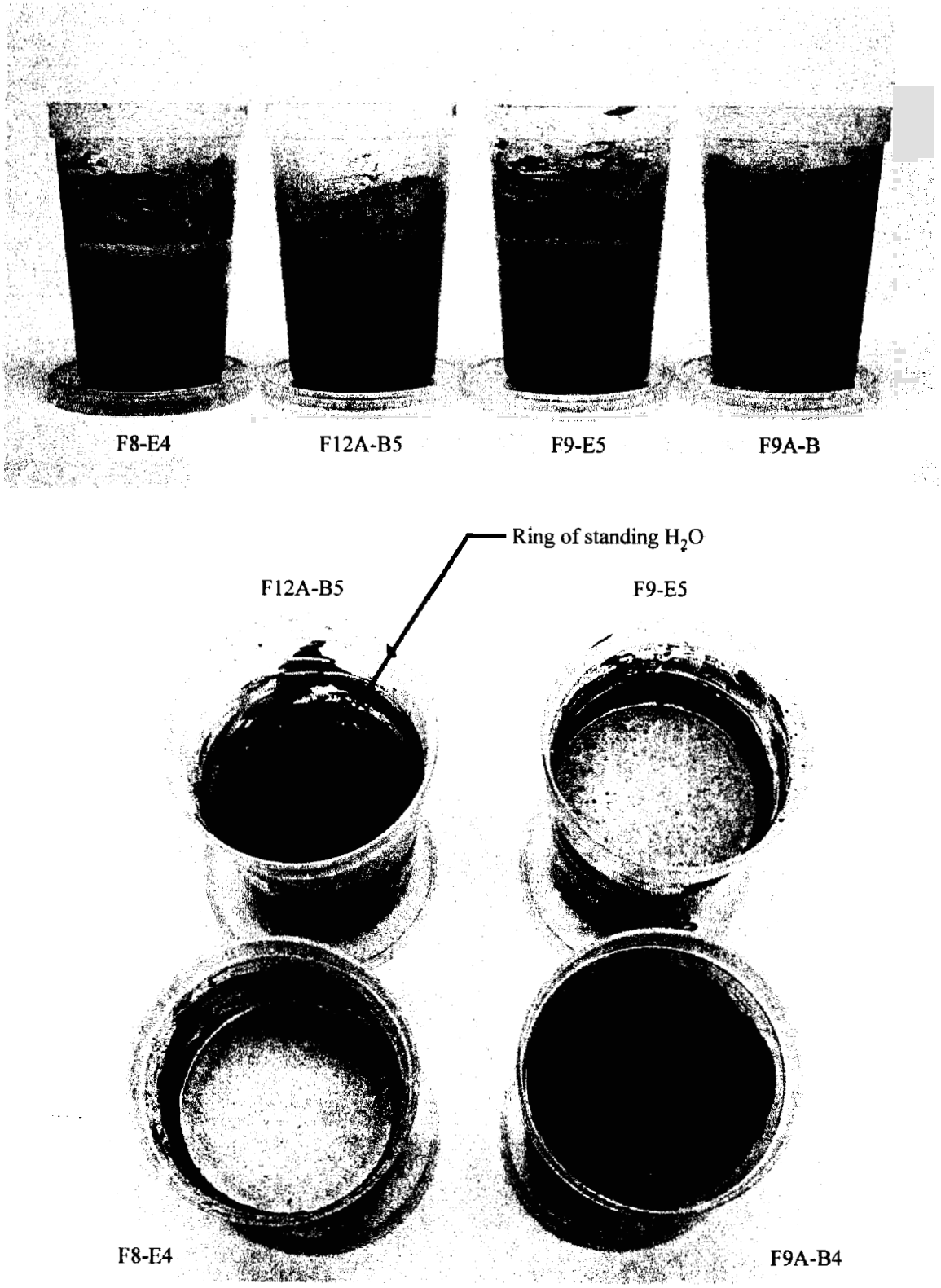

Figure F-5. Photographs of grout samples for physical properties.

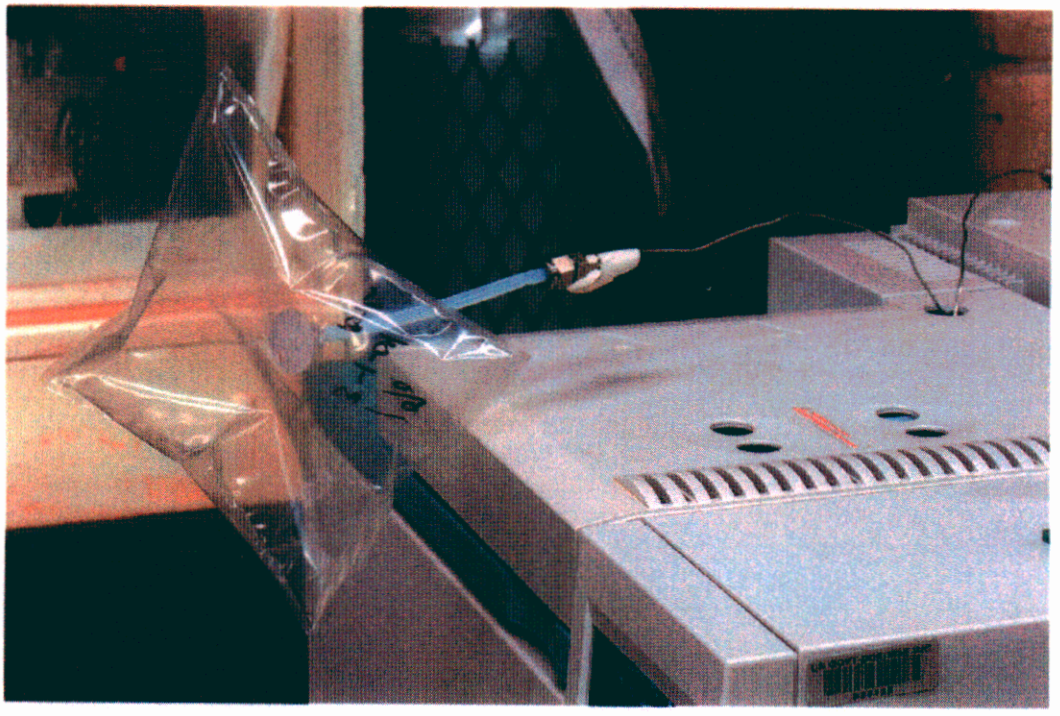

Figure F-6. Photograph of Tedlar bag.

Appendix G

Heat Balance

Appendix G

Heat Balance

G-1. HEAT BALANCE

To determine the exothermicity of the chemical oxidation process and collect data to support TO3, temperature data was collected during selected test runs. A heat balance was performed for each set of temperature data to estimate the heat of reaction. The results for each test are summarized in Table G-1-1.

Table G-1-1. Mathcad heat loss calculation.

Energy Loss from the 1000 ml reaction Flask

Top of flask Area $A1 := 188 \cdot (in)^2$

Top surface Temp $Ts := (165 + 460) \cdot R$

Air Temperature $Ta := (87 + 460) \cdot R$

HT coefficient $Uo := 3.0 \cdot \frac{BTU}{(hr \cdot R \cdot ft^2)}$

Convection Loss $Q := Uo \cdot A1 \cdot (Ts - Ta)$

$Q = 306 \circ \frac{BTU}{hr}$ $Q = 1 \cdot 10^3 \circ \frac{cal}{min}$

Radiation Loss $e := 0.94$

$TS := \left(\frac{Ts}{100 \cdot R}\right)^4$ $TA := \left(\frac{Ta}{100 \cdot R}\right)^4$

$Qr := 0.1713 \cdot \left[\frac{BTU}{(hr \cdot ft^2)}\right] \cdot e \cdot A1 \cdot (TS - TA)$

$Qr = 133 \circ \frac{BTU}{hr}$ $Qr = 557 \circ \frac{cal}{min}$

Total Top Half Loss $Qtt := Q + Qr$

$Qtt = 1840 \circ \frac{cal}{min}$

Bottom of flask Area $A2 := 265 \cdot (in)^2$

Bottom surface Temp $Tsb := (169 + 460) \cdot R$

Air Temperature $Ta := (87 + 460) \cdot R$

HT coefficient $Uo := 3.0 \cdot \frac{BTU}{(hr \cdot R \cdot ft^2)}$

Convection Loss $Q := Uo \cdot A2 \cdot (Tsb - Ta)$

$Q = 453 \circ \frac{BTU}{hr}$ $Q = 1901 \circ \frac{cal}{min}$

Radiation Loss $e := 0.94$

$TSb := \left(\frac{Tsb}{100 \cdot R}\right)^4$ $TA := \left(\frac{Ta}{100 \cdot R}\right)^4$

$Qr := 0.1713 \cdot \left[\frac{BTU}{(hr \cdot ft^2)}\right] \cdot e \cdot A2 \cdot (TSb - TA)$

$Qr = 199 \circ \frac{BTU}{hr}$ $Qr = 834 \circ \frac{cal}{min}$

Total Bottom Half Loss $Qtb := Q + Qr$

$Qtb = 2735 \circ \frac{cal}{min}$

Total Flask Loss $Qtf := Qtt + Qtb$

$Qtf = 4575 \circ \frac{cal}{min}$

G-1.1 System Description

The "F-series," bench-scale, cold tests were performed in a 1,000 mL reaction flask. The reaction flask has a heating jacket enclosing its bottom half through which silicone heating oil is pumped to attain the desired reaction temperature.

The temperature of the flask contents was measured with a combination pH–temperature probe that is immersed in the liquid. Target temperatures for the reaction flask contents were 40°C and 80°C. The temperature of the flask contents would rise about 10°C during the course of a run, depending on the initial temperature.

The contents of the flask were mixed with a curved blade half-moon-shaped stirrer; the stirring rate was typically between 375–450 rpm.

Vapors exiting the reaction flask were cooled with a reflux condenser. Water at 5°C was used as the cooling medium. The water temperature rose during a typical run to between 6.5°C and 7.5°C. The concurrent, gas-to-liquid approach temperature at the top of the reflux condenser was about 7°C. The gas temperature approximated room temperature shortly downstream of the reflux condenser.

During the course of the experiments, 50% hydrogen peroxide solution was injected through one of the necks of the reaction flask. Injection occurred at 5 mL/min for the first 10 min of each run and was then lowered to 2 mL/min until the desired quantity of peroxide was added. For most runs, a total of either 400 or 500 mL of peroxide was injected. Other runs had peroxide additions of 150 mL, 250 mL, and 600 mL.

Upon injection of hydrogen peroxide, gas began exiting the flask at a rate depending on the run temperature. At 80°C target temperature, the gas rate was as high as 0.4 g/min; at 40°C, the rate was typically 0.02 g/min, or more than an order-of-magnitude less.

G-1.2 Heat Balance Method

In order for the contents of the reaction flask to stay at a steady temperature, heat generated by reaction, and heat added by the silicone oil, has to be lost through the reflux condenser and the glass surface of the flask, itself. The energy of the flask contents is also slightly affected by the enthalpy of the peroxide stream entering the flask, and the enthalpy of the vapor stream leaving it.

The following defines the variables used in determining the heat balance:

ΔHg: heat generated by reaction in the flask in calories per minute;

ΔHo: enthalpy lost by the silicone oil as it is pumped through the flask;

ΔHcw: enthalpy gained by the condenser water in calories per minute;

ΔHp: enthalpy gained by the peroxide entering the flask;

ΔHog: enthalpy of the gas leaving the reflux condenser;

Qc: heat lost by the gas as is transits the reflux condenser;

Qtt: total heat lost by the flask through its surface.

Qtc: convective heat loss from the top-unjacketed-half of the flask:

Qbc: convective heat loss from the bottom-jacketed-half of the flask;

Qtr: radiative heat loss from the top of the flask;

Qbr: radiative heat loss from the bottom of the flask;

Ta: ambient room temperature;

Toi: silicone oil temperature from the oil heater;

Tor: silicone oil return temperature;

Tci: condenser water inlet temperature;

Tcr: condenser water return temperature;

Tt: flask top half surface temperature;

Tb: flask bottom half surface temperature.

Mo: silicone oil flow rate;

Mc: condenser water flow rate;

Mp: peroxide flow rate;

Mog: reflux exit gas flow rate;

Yog: volume percent water vapor in the reflux exit gas;

Cw: water specific heat;

Co: silicone oil specific heat;

ΔH_{H2O}: latent heat of water vaporization.

The following equates the energy generated by reaction, and the energy transferred into the flask by the silicone oil and the hydrogen peroxide, to the energy lost by convection and radiation from the surface of the flask and by transport of vapor from the flask:

$$\Delta Hg + \Delta Ho + \Delta Hp = Qtt + Qc + \Delta Hog$$

The overall heat balance can be rewritten as,

$$\Delta Hg = -\Delta Ho - \Delta Hp + Qtt + Qc + \Delta Hog$$

The enthalpy change of the oil (ΔHo) is negative since the oil cools. The oil enthalpy change is calculated by

$\Delta Ho = Mo\ Co\ (Tor-Toi)$.

The enthalpy change of the condenser water (ΔHcw) is a positive number, since the water heats up. The condenser water enthalpy change is subtracted from the energy in the flask since it represents heat taken away from the flask, or, $Qc = -\Delta Hcw$. The heat taken away from the flask is due to cooling of the non-condensable gas formed by reaction and by condensing of the water vaporized into the gas stream. For the purpose of this analysis, it is assumed that the gas will be saturated by water vapor as it exits the reflux condenser at the temperature indicated at sample port "P2" of the glassware apparatus (Figure G-2-1). The amount of heat transferred to the condenser water is

$\Delta Hcw = Mc\ Cw\ (Tcr - Tci)$.

The exit gas from the reflux condenser is cooled to the point of having near zero enthalpy; however, there is a certain fraction of water vapor that has evaporated into it. The energy leaving the flask due to water evaporation is accounted for by

$\Delta Hog = Yog\ Mog\ \Delta H_{H2O} / 31.3$ g/gmol.

An average molecular weight of 31.3 has been estimated for the exit gas based on it consisting almost entirely of oxygen, with about 5% water vapor as its main constituents.

The total heat loss through the glass surface of the flask is equal to the convective loss and radiative losses from the top of the flask, which are a function of the surface temperature of the glass; and the corresponding losses through the outer surface of the heating jacket, which are a function of the surface temperature of that portion of the flask, or

$Qtt = Qtc + Qtr + Qbc + Qbr$.

Several approaches to estimating the heat loss from the flask were made. The method validation test that was run on 21 July included all components of the surrogate but no peroxide injection. Thus, any heat added to the system by the silicone oil had to be lost through the reflux condenser and glass surfaces of the flask. There should be no term for heat generation by reaction.

The upper and lower glass surface areas of the flask were estimated, and convection and radiation equations written to attempt to correlate the losses. Mathcad was used to estimate the losses. The Mathcad calculations used the surface temperatures of the flask and the ambient air temperature to estimate the heat losses. The convective heat transfer coefficient was the only correlating variable. The results of the calculations for one case are shown in Table G-1-1.

The heat loss equations were added the Excel spreadsheet used to reduce the run data. It was eventually found that a value of the convective coefficient of about 2.75 Btu/hr/ft^2/°F provided a near fit to the data from the final few tests.

On the 7th and 12th of August, further attempts to correlate the heat loss from the reaction flask were made. In these tests, 500 mL of water was placed in the flask and the silicone oil used to heat it. The water to the reflux condenser cooled any resulting vapor.

The data from the heat loss runs were correlated with a linear least squares program against both oil bath temperature (Toi) and oil bath temperature minus ambient temperature (Toi – Ta). Both correlated with an r = 0.99.

The resulting correlations were,

Qtt = 66.48 (Toi – Ta) – 411.25 cal/min, with T in °C.

Qtt = 66.52 Toi – 2324.54 cal/min.

At 100°C oil temperature and 25°C ambient temperature, the above correlations predict a heat loss of 4,330 and 4,570 cal/min, respectively.

The heat losses from the correlations were used to find a heat transfer coefficient for Run F16 that would match the heat losses from the glassware in the heat loss tests. The average heat transfer coefficient for F-16 was 2.74.

G-1.3 Determination of Heat of Generation

Before discussing the heat generation measured during the tests using the above equations, the maximum heat that could be generated with this reaction system must be estimated. Conceptually, the maximum heat capable of being generated is when all of the peroxide decomposes to oxygen and when all of the oil and organic solvents are "burned."

For peroxide decomposition, the overall reaction is

H_2O_2 (l) → H2O + 1/2 O_2.

Since the heat of formation of peroxide is –45.16 kcal/gmol, and the heat of formation of water is -68.3174 kcal/gmol, the heat of reaction for the decomposition is

$\Delta H°_r$ = –68.3174 kcal/gmol – (–45.16 kcal/gmol) = – 23.2 kcal/gmol H_2O_2.

Per gram of peroxide

$\Delta H°_r$ = – 23.2 kcal/gmol H_2O_2 * 1,000 cal/kcal / 34 g/gmol = – 681 cal/g.

During a typical run, 500 mL of 50% hydrogen peroxide was charged to the reaction flask. Since the specific gravity of the solution is about 1.2, about 300 g of peroxide is charged.

The maximum heat that can be generated by 300 g of peroxide is

$\Delta H°_r$ = – 681 cal/g • 300 g H_2O_2 = –204,000 cal.

If a run generates gas for 6 hr and totally decomposes peroxide to oxygen, then the rate of heat generation could be

$\Delta H°_r$ = –204,000 cal/ (6 hr • 60 min/hr) = – 568 cal/min.

About 4 g of various oils was added to the reaction flask. For a typical hydraulic oil, the heat of combustion is about 46 kJ/g or about 11,000 calories per g (19,800 Btu/lb). The heat released by the combustion of this oil should be about

$\Delta H°_C$ = 4 g • 11,000 cal/g = 44,000 cal.

Over the course of 6 hr, oxidation of the oil should release about 44,000/6/60 = 122 cal/min.

Therefore, during the course of a typical V-tanks run, the heat released from the reactor should be somewhere between 122 and 568 cal/min, depending on the combination of oxidation of the oil and decomposition of the peroxide that occurs at the reaction conditions. The range of heat generation estimated above reflects the heat of reaction at room temperature; at reaction conditions, it should be somewhat less.

The formal runs numbered F-20 (80°C, 150 mL H_2O_2, 8 hr), F-16 (80°, 500 mL H_2O_2, 12 hr), F-21 (80°C, 250 mL H_2O_2, 8 hr) and F-13 (40°C, 400 mL H_2O_2, 12 hr) were the only ones in which the heat transfer data appeared to be valid. The pertinent run data and point values of calculated heat generation are listed in Table G-1-2.

Table G-1-2. Heat generation data.

Time	Temperature °C	Peroxide Rate mL/min	Gas Rate g/min	Heat Generation cal/minute
Run F-20 (80°C, 150 mL H_2O_2, 8 hr; start time 08:15)				
08:38	89.6	2	0.396	-2718
09:33	90.8	0	0.329	-2453
10:32	85.3	0	0.078	-1825
11:32	82.9	0	0.020	-1568
13:56	83.8	0	0	-2224
Run F-16 (80°, 500 mL H_2O_2, 12 hr; start time 07:30)				
08:50	91.7	2	0.417	-2129
09:50	91.9	2	0.408	-2326
10:50	92.5	2	0.427	-2317
11:35	93.4	0	0.423	-2568
12:40	91.5	0	0.206	-2249
13:40	90.1	0	0.1	-2520
14:53	86.3	0	0.046	-2088
Run F-21 (80°C, 250 mL H_2O_2, 8 hr); start time 09:00)				
10:45	90.7	2	0.402	-1701
Run F-13 (40°C, 400 mL H_2O_2, 12 hr; start time 08:30)				
09:38	43.7	2	0	-3122
10:32	44.3	2	0.023	-3107
11:35	45.7	2	0.027	-1538
12:35	47.2	0	0.028	-1603
13:46	47.5	0	0.029	-1515
14:35	46.8	0	0.026	-1600
15:20	45.7	0	0.023	-2080
16:40	45.1	0	0.021	-2080
17:35	44.8	0	0.020	-1228

The 22 separate evaluations of the heat generated during Fenton's oxidation as given in Table 1-2 appear to have no pattern. Furthermore, they all are physically impossible, unless additional reactions are occurring that are not accounted for by oil oxidation or peroxide decomposition. Since all of the inorganic compounds in the charge are oxidized, there are probably no other reactions occurring that would account for the three to six times greater measured heat generation than should be possible.

There are two possible reasons the calculated rate of heat generation is high. In the first case, the water and gas flow concurrently into the reflux condenser. Concurrent flow allows the temperatures of each stream to approach each other within a heat exchanger and reach a minimum difference where heat transfer effectively stops; this is called a "pinch" point.

Part way through the series of peroxide tests, the chilled water flow rate in the reflux condenser was lowered from about 2000 mL/min to about 1,000 mL/min. The exit temperature of the chilled water from the reflux condenser remained approximately the same during the subsequent tests; that is, about 6.5 to 7.5°C. It can be concluded that the reflux condenser operation is pinched and thus the calculated amount of heat removed by it (water flow rate times heat capacity times temperature difference) is overestimated due to the effect of the water flow rate. Given the exit temperatures of the water from the condenser, the water flow rate would have to be reduced to about 200 mL/min for the calculated heat generation rate to be within the credible range of no more than about 600 cal/min.

The other reason the heat generation rate would be high is that we have no certain data on the specific heat of the silicone oil used in the heating bath for the reaction flask. The vendor has never returned any of our inquiries for this number. We have assumed a heat capacity of 0.4 cal/g/°C for the oil, based on published data for similar oils. If the heat capacity is actually 0.55, the heat generation rate would fall into the reasonable band.

Presently, we have no data that explains the heat generation from the oxidation reaction. If we can determine the heat capacity of the silicone oil, we may be able to recover some of the results. However, there would still be the uncertainty caused by the water exit temperature of the assumed "pinched" reflux condenser. Follow-on tests will utilize an oil with published data so that the heat balance results will be more reasonable.

G-1.4 Revised Heat Generation Data

In an attempt to salvage some information on heat generation from the test results, an alternative heat balance was calculated. Heat losses from the flask were estimated using the correlation developed from the results of the August 7th through 12th activities:

Qtt = 66.48 (Toi – Ta) – 411.25 cal/min, with T in °C.

The heat supplied to the flask by the silicon oil remained the same, assuming a specific heat of 0.4 calorie per gram per degree C.

To estimate the heat lost through the gas exiting the reflux condenser, it was assumed that the gas in the flask was saturated at the temperature measured by the pH probe in the flask, and that the gas would be saturated at the temperature measured at the exit of the reflux condenser (location P1).

Given the assumptions above and the flow of gas measured by the bubble meter, the overall enthalpy change of the gas can be estimated. The calculation for this enthalpy change was added to the test run spreadsheet, as well as the correlated heat loss for each data point. The two heat-loss numbers were then used with those previously calculated to give a "revised accumulation/generation" calculation. The

revised generation numbers were calculated in the spreadsheet for each time that heat generation data were collected. These estimates are summarized below. A calculation of the anticipated accuracy of the heat generation was estimated at ± 60%, due almost entirely to the uncertainty of the heat capacity of the silicone oil.

Time	Temperature °C	Peroxide Rate mL/min	Gas Rate g/min	Heat Generation (Revised)	
				calorie/minute	ΔΘ (min.)
Run F-20 (80°C, 150 mL H_2O_2, 8 hr; start time 08:15)					
08:38	89.6	2	0.396	-978	23
09:33	90.8	0	0.329	-780	78
10:32	85.3	0	0.078	+18	137
11:32	82.9	0	0.020	+296	197
13:56	83.8	0	0	+217	339

The objective of this run was to determine the effect of minimal peroxide on DRE. Heat generation was minimal as indicated by the values for 23 and 78 minutes into the test (ΔΘ). While peroxide was being added, the heat generated was nearly 1,000 calories per minute. Heat generation then dropped off rapidly and heat had to be added to the flask to maintain temperature, as indicated by the positive generation numbers.

Time	Temperature °C	Peroxide Rate mL/min	Gas Rate g/min	Heat Generation (Revised)	
				calorie/minute	ΔΘ (min.)
Run F-16 (80°, 500 mL H_2O_2, 12 hr; start time 07:30)					
08:50	91.7	2	0.417	-1114	80
09:50	91.9	2	0.408	-1162	140
10:50	92.5	2	0.427	-996	200
11:35	93.4	0	0.423	-1140	245
12:40	91.5	0	0.206	-440	310
13:40	90.1	0	0.1	-516	370
14:53	86.3	0	0.046	+42	443

This run represents the base case for high temperature oxidation. Peroxide decomposed as it was added, as indicated by the high gas-generation rate. The average generation rate was nearly 1,100 calorie per minute during peroxide injection. At the early part of the run, heat generation peaked, with gradual lessening as the average concentration of peroxide decreased. At the beginning of this series of tests, 50-mL of peroxide are injected in 10 minutes. At the injection rate of 5 mL peroxide per minute, the maximum heat that could be generated is –3,410 calorie per minute. Since Fenton's reaction requires an initiation period to build up free radicals, the generation of reaction heat is not instantaneous. Therefore, heat generation rates early in the run of –1,100 calories per minute are not unreasonable. However, as peroxide injection slows and decomposition continues to occur, the generation rate has to drop to the values anticipated by thermodynamics for the average during a test. Run F-16 (80°C, 500 mL H_2O_2,

12 hr) shows the gradual drop-off of heat generation with the eventual need to add heat to maintain the flask temperature.

Time	Temperature °C	Peroxide Rate mL/min	Gas Rate g/min	Heat Generation (Revised) calorie/minute	Heat Generation (Revised) ΔΘ (min.)
Run F-21 (80°, 250 mL H_2O_2, 8 hr; start time 09:00)					
10:45	90.7	2	0.402	-1023	75

Only one measurement of heat generation was made during Run F-21 (80°C, 250 mL H_2O_2, 8 hr). This measurement was made during the period when 2 mL peroxide per minute were being injected and again shows a tendency to be around –1,000 calorie per minute.

Time	Temperature °C	Peroxide Rate ml/min	Gas Rate gm/min	Heat Generation calorie/minute
Run F-13 (40°C, 400 mL H_2O_2, 12 hr; start time 08:30)				
09:38	43.7	2	0	-201
10:32	44.3	2	0.023	-154
11:35	45.7	2	0.027	-21
12:35	47.2	0	0.028	-5
13:46	47.5	0	0.029	+104
14:35	46.8	0	0.026	-17
15:20	45.7	0	0.023	-40
16:40	45.1	0	0.021	-269
17:35	44.8	0	0.020	-34

Run F-13 (40°C, 400 mL H_2O_2, 12 hr) was the only one in which 40°C heat-generation data was collected. The generation rate was well within that anticipated for a combination of peroxide decomposition and surrogate oxidation. The data also show a fluctuation that had been noticed in the earlier beaker tests—in those tests the temperature would rise from 40°C to near boiling, and then cool before repeating the cycle. In the case of the flask tests, the silicone oil in the jacket of the flask tends to hold the temperature within a narrow band since its temperature is controlled. Because there is an enormous amount of residual peroxide (approximately 35%) in the product from 40°C tests, there is a high potential for temperature excursions and run-away reactions to occur.

The reflux-condenser-water flow rate was measured incorrectly during the following runs. Nevertheless, using the effluent gas assumption allows calculation of a revised heat generation rate.

Time	Temperature °C	Peroxide Rate mL/min	Gas Rate g/min	Heat Generation (Revised) calorie/minute	Heat Generation (Revised) ΔΘ (min.)
Run F-5 (500 ml hydrogen peroxide; start time 10:00)					
15:30	87	0	0.162	-764	330

The one data point collected for the F-5 run shows a heat generation rate consistent with the F-13 (40°C, 400 mL H_2O_2, 12 hr) run and within the anticipated error band.

Time	Temperature °C	Peroxide Rate mL/min	Gas Rate g/min	Heat Generation (Revised) calorie/minute	Heat Generation (Revised) ΔΘ (min.)
Run F-8 (500 mL hydrogen peroxide; start time 09:45)					
10:30	87.6	2	0.477	-915	45
13:25	89	2	0.478	-918	220
15:25	85.9	0	0.016	+232	300

The data collected for F-8 seems to corroborate the data from other 80°C tests; however, it appears that the generation of heat falls off more rapidly than in other 500 mL runs. There is nothing in the test conduct that indicates why this should be so.

Time	Temperature °C	Peroxide Rate mL/min	Gas Rate g/min	Heat Generation (Revised) calorie/minute	Heat Generation (Revised) ΔΘ (min.)
Run F-9A (80°C, 500 mL H_2O_2, 8 hr); start time 09:45)					
11:32	87.8	2	0.390	-255	107
12:51	89.5	2	0.503	-659	186
15:05	87.7	0	0.266	-415	218
17:23	83.1	0	0	-295	356

Test F-9A (80, 500 mL H_2O_2, 8 hr) is a replicate of Test F-8 (80°C, 500 mL H_2O_2, 8 hr); a lower heat generation rate is apparent, but within the anticipated error.

Time	Temperature °C	Peroxide Rate mL/min	Gas Rate g/min	Heat Generation calorie/minute
Run F-9 (80°C, 400 mL H_2O_2, 8 hr; start time 09:00)				
08:40	79.5	0	0	+728

The F-9 (80°C, 400 mL H_2O_2, 8 hr) data point was taken before peroxide injection commenced. The value of +728 cal/min indicates the amount of heat needed to maintain flask temperature.

Time	Temperature °C	Peroxide Rate mL/min	Gas Rate g/min	Heat Generation (Revised)	
				calorie/minute	ΔΘ (min.)
Run F-10 (80°C, 400 mL H_2O_2, 12 hr); start time 09:00)					
09:39	92.3	2	0.454	-1236	39
10:32	91.6	2	0.358	-827	92
11:41	93	2	0.441	-447	161
12:41	93.8	0	0.398	-364	221
13:52	91.3	0	0.173	-246	292
15:33	86.7	0	0.040	-142	403
16:42	85.1	0	0.013	+159	472

Run F-10 (80°C, 400 mL H_2O_2, 12 hr) shows the high generation rate of Run F-16 (80°C, 500 mL H_2O_2, 12 hr) with a gradual fall off. Since F-10 had 100 mL less peroxide injected than in F-16, lower period of higher heat generation for F-16 will probably result.

Time	Temperature °C	Peroxide Rate mL/min	Gas Rate g/min	Heat Generation (Revised)	
				calorie/minute	ΔΘ (min.)
Run F-12 (80°C, 500 mL H_2O_2, 12 hr); start time 09:45)					
09:55	85.3	5	0.192	+233	10
11:02	88.7	2	0.363	-731	77
12:18	88.6	2	0.392	-885	153
13:16	89.2	2	0.437	-728	211
14:17	89.6	0	0.008	+149	270
15:40	87.5	0	0.181	-59	347
19:10	83.4	0	0.012	+384	557

Run F-12 (80°C, 500 mL H_2O_2, 12 hr) appears to somewhat contradict the previous high temperature runs. At 10 minutes into the run, heat is still being required to maintain temperature. Once gas begins to be generated, heat also begins to be generated. The generation rate of heat nears the higher values of the other 80°C runs.

For the runs made with the initial temperature around 80°C, the average heat generation rate measured was –450 calories per minute. A more realistic heat generation rate would be those when peroxide was being injected; these rates average –846 calories per minute for the data taken when 2 mL peroxide per minute was being injected.

TO3 was to estimate the heat generation rate of the "reaction." For test runs that had an initial temperature of 80°C, the exothermic heat generated averages about –850 calories per minute with a range of –340 to –1,350 calories per minute. As stated previously, since peroxide decomposition appears to be

the dominant contributor to heat generation at the high temperature, a value of more than about –600 calories per minute is suspect. However, a heat generation value as high as –3,400 calories per minute when 5 mL of peroxide per minute is being injected could occur, unless initiation lag time inhibits the generation of heat.

The 40°C run shows much less heat generation. At 40°C, however, there appears to be a danger of thermal runaway due to the high concentration of residual hydrogen peroxide. Any future tests at 40°C should use much lower peroxide injection quantities and be run until gas and heat generation ceases.

The scale of the flask tests did not allow definitive estimation of heat generation, particularly due to the pinch condition that occurred in the reflux condenser. If a scaled-up test series is to occur, the design of the apparatus needs to anticipate data insufficiency and more carefully attend to data collection. If a semi-batch scale-up is done, it still will be difficult to determine the heat of reaction and attribute the heat generation to a particular reaction condition, since the data collected represents an integral result. Differential reaction testing would have to be done to accurately determine the heat generation rate and attribute it to a suite of reactions occurring in the reaction system.

Appendix H

Environmental Protection Agency and Idaho Department of Environmental Quality Review Comments

INEEL
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PROJECT DOCUMENT REVIEW RECORD

DOCUMENT TITLE/DESCRIPTION: V-tank Cold Bench-scale Test Report

DATE: 3-1-04 **REVIEWER:** **EPA**

ITEM NUMBER	SECTION NUMBER	PAGE NUMBER	COMMENT	RESOLUTION
GENERAL COMMENTS				
1			It is not clear how much of the information gathered by these tests will be transferable to the proposed treatment technology involving ozone. These tests appear to indicate that he use of oxidants required that the surrogate be heated to 80'C since operations at 40'C had a high potential for runaway reactions. Also, the tests had limited success in removing BEHP. Is it anticipated that the use of ozone will have different results? Or, based on these tests, should the design of the treatment system include the ability to heat the V-tank waste and an alternate treatment process for BEHP be developed?	We acknowledge that the Fenton's work is not directly transferable to the ozone, sonication, electrolysis, UV system. The temperature issue no longer applies either. Current testing of ozone sonication will be performed with a solution at 15 C. This low temperature favors the cavitation process, which produces extremely high local temperatures and pressures. An advantage of the proposed treatment method is that sonication, electrolysis, and UV are pure energy, and ozone is a gas, so there is no volume increase from this method no matter how long it is run. It can be applied continuously without adverse impact for as long as necessary to meet treatment goals. For this reason we are confident it will meet BEHP goals. Adding aqueous reagents such as peroxide continue to increase volume and therefore requirements for process vessel and disposal capacity.
2			Also, it was not encouraging to read (Sect. 3.1.7.3) that the "present data cannot be used to assess the potential for VOC destruction by Fenton's reagent. Similarly no quantification of potential conversion of elemental mercury (volatile) to aqueous forms cannot be offered" Has any more data arrived to resolve this issue that present data does not?	This statement is more pessimistic than necessary. It is based on the fact that VOC vaporize, possibly before they are reacted. In addition, the data referred to do not indicate volatile mercury or no destruction of VOC. They are merely inconclusive in proving otherwise. We prefer destruction, but find vaporization/capture to be an acceptable means for dealing with the VOC. If we achieve a satisfactory end state, it is not essential to know the fractions destroyed or captured.
SPECIFIC COMMENTS				

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PROJECT DOCUMENT REVIEW RECORD

DOCUMENT TITLE/DESCRIPTION: Cold Bench Scale Final Test Report for Chemical Oxidation/Stabilization of Surrogate V-tank Waste

DATE: 2-17-04 **REVIEWER:** **IDEQ Technical Review Comments**

ITEM NUMBER	SECTION NUMBER	PAGE NUMBER	COMMENT	RESOLUTION
GENERAL COMMENTS				
1			The inability to quantify what percentages of the CFTs were treated versus volatilized is discussed many times throughout the document (e.g. Section 5.1, last paragraph, pg. 5-1). One way of addressing this lack of information would be to run a blank performed in exactly the same way as the oxidation/reduction test without the addition of the oxidation/reduction reagent. Bubbling a known volume of oxygen through the surrogate would take the place of the reagent, as was done with run MV (section 3.1.6.1, first paragraph, pg 3-10). A comparison of the DREs between a blank run and the oxidation/reduction run could show how much of the VOC is being lost to volatilization due to mechanical mixing. Please address this possibility.	A test of this nature was performed. The low final VOC values indicate that these components can be effectively removed by air sparge.
2			There is no thorough description of the mechanism for the oxidation/reduction reaction. Please include a description of the basic mechanism, intermediates, and expected/desired products. Include necessities for any catalysts used.	A thorough description of reaction mechanisms is beyond the scope of these tests. It is anticipated that the reaction will proceed in a sequential manner, with a series of intermediates. The desired end products are fully mineralized forms of carbon, hydrogen, and chlorine. From response 1 we know that volatile intermediates may evaporate before they react, in which case they would be captured on the GAC filter.
3			There was no discussion on whether the products of the reaction may also be considered hazardous. Please include if there is a possibility of such products being formed.	This possibility cannot be ruled out. Any such intermediates would be subject to further reaction or volatile/capture.
4			Please discuss the implications on DREs upon scaling up.	The tests were structured to provide the most general information possible. The stirred-tank nature of the process should lend itself to straightforward scale-up, at least as far as DRE is concerned. There may be engineering issues, such as heat transfer, that would require the expert skills of the MSE staff for scaling.

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ITEM NUMBER	SECTION NUMBER	PAGE NUMBER	COMMENT	RESOLUTION
5			Discuss the possibility of attempting to find an optimal temperature at which the quantity of volatilized VOC is minimal and destruction by oxidation/reduction is maximal.	Tests at lower temperatures clearly demonstrated the risk of accumulating unreacted peroxide at low temperatures that became available to fuel a runaway reaction. The temperature selected avoided this risk, and for safety reasons we are reluctant to change it.
6			Discuss if pressurizing the reaction vessel to increase the amount of time the oxidizing agent is in solution is a possibility.	Pressurizing the reactor would likely increase reaction effectiveness, but is not worth the tremendous increase in engineering effort to contain and regulate the pressure safely.
7			Discuss the reason for pH control and the possible implication on the reaction.	The selected pH was identified as most favorable to reaction progress, and the runaway reaction issue mentioned in resolution 5 is a risk for other Ph values as well as temperature.
8			Discuss the results of trials with and without the reflux condenser.	Because of the high temperatures involved, no tests were performed without the reflux condenser.
9			Include a synopsis of research that has been done on oxidation/reduction on this type of system. Include if it has been done on this scale, and on this type and concentration of waste, and the level of expectation that it should work based on the research. This request is only for research referenced in the preparation for this experiment.	Sodium persulfate was originally considered as an oxidant, but rejected in favor of Fenton's reagent due to the tremendous mass that would be required, and the resulting slurry would be difficult to grout. Fenton's was the next-most aggressive reagent available.
SPECIFIC COMMENTS				
		2-8	Please discuss if the purpose of pH adjustment extends beyond controlling autocatalytic reactions (section 3.3, paragraph 5, pg 3-22), and if this will also be done on the large scale.	Preventing autocatalytic reactions implies running at the most favorable pH for reaction progress, which is also desirable. This will be done in the full scale process.

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DATE: 2-17-04 **REVIEWER:** **IDEQ Technical Review Comments**

ITEM NUMBER	SECTION NUMBER	PAGE NUMBER	COMMENT	RESOLUTION
2	3.1.1	3-2	The result showing that there was residual hydrogen peroxide in the shakedown test performed at 40 degC and none in the shakedown test performed at 80 degC, leads to the conclusion that there may be an intermediate temperature where there would be a smaller percentage of H2O2 degraded without reacting than at 80 degC. This comment is in connection with comment 5 of the General Comments.	The desired reactions appear to occur concurrently with the breakdown of peroxide. Though optimization would be desirable, the limited number of tests we were able to run did not allow many intermediate test values.
3	3.1.3	3-4	Please expand on the statement that destruction efficiencies mimic Henry's Law coefficients.	In general, more volatile components had higher DREs. This is probably due to vaporization, but the simpler, lighter molecules may react more easily. As noted above, this cannot be distinguished by the test results.
4	3.1.5	3-10	Please address the possible fire hazard associated with this method of treatment, due to the high generation of oxygen.	This issue must be addressed in design. Limited fuel, lack of ignition sources, and saturated water vapor all serve to mitigate the fire hazard.
5	3.1.5	3-10	Due to the statement that 96-98% of the peroxide converts straight to oxygen at 80 degC, address the possibility of conducting the treatment at a lower temperature.	See response to comment 2
6	3.1.6.1	3-12	It is stated in the first paragraph that titration results lead to the conclusion that the residual peroxide was below 2% by weight. In the second paragraph, as a result of a suspected continued reaction the concentration of residual peroxide was greater than 35% by weight. Please clarify this apparent contradiction.	There is an error in the text. The high peroxide value is from 40 C tests, not 80 C

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ITEM NUMBER	SECTION NUMBER	PAGE NUMBER	COMMENT	RESOLUTION
7	3.1.6.1	3-12	As stated in the first paragraph that the 80 degC product had 3 phases: an oil phase, an aqueous phase with the appearance of a cloudy brine, and a red solid phase. The second paragraph states that centrifugation did not separate the product into three phases. a) Please describe the surrogate phases. b) Please discuss if further settling resulted in a clearer aqueous phase, and if it is suspected that the cloudiness is suspended solid or liquid/aqueous phase contaminants. c) Please clarify if the centrifugation was conducted on a cooled product. Please state if the solid phase is a result of the autocatalytic reaction of Fe(OH)3 (Section 3.3, paragraph 5), if it was analyzed, and if there is reason to expect that there would be CFT in the solid phase.	Definite phase separation was obtained for the 80 C tests. The product from the 40C tests would not separate. The surrogate contained the full inventory of organics in a separate phase. The centrifuged aqueous phase was nearly clear; there was no appearance of suspended solids. The centrifugation was conducted on a cooled product. The solid phase consisted of particulates added to simulate the sludge, and extra iron added as Fenton's catalyst. The destruction of the organic phase, the clarity of the aqueous phase, and the fine, silty nature of the settled solids lead us to suspect there were no CFT remaining in the solids.
8	3.1.7.1	3-12	Remove the first or second paragraph, as they are exact repeats.	Will correct as noted.
9	3.1.7.1	3-13	Please address the likelihood that alcohols, carboxylic acids, and aldehydes will be formed instead of carbon dioxide.	These are likely to be formed as intermediate reaction products.
10	3.2	3-15	Please include a picture of the Tedlar bag setup.	MSE will provide

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ITEM NUMBER	SECTION NUMBER	PAGE NUMBER	COMMENT	RESOLUTION
11	3.2	3-15	An actual gas generation rate, rather than an average rate based on total volume over total time, may lead to information about the degradation of peroxide to oxygen and the volatilization of VOCs with the increased temperatures and turbulence due to raised concentrations of peroxide in the reaction vessel. Collecting this information in further tests of this type could lead to useful information.	Actual gas generation rates were measured at frequent intervals during the tests, but only composite values were reported.
12	3.4	3-24	Please provide a brief explanation of Eh.	This is the electrochemical potential of the solution, measured in volts.
13	3.4.1	3-25	Clarify that the O2/CO2 monitor used for CO2 measurements was able to differentiate between O2 and CO2 and that there weren't difference calculations that had to be made using other O2 data.	This instrument analyzed for O2 and CO2 separately.
14	3.4.1	3-25	Beyond weighing the oil/grease recovered as described in Section 3.1.7.2, third paragraph, page 3-13, was there any analysis conducted on the compounds in the oil/grease? Also discuss the possibility that the oil/grease could be removed upon settling and then reacted further, and if this would be an effective treatment option with respect to percentages of the CFT in this phase.	No such analysis was conducted.
15	3.4.3	3-27	Discuss reasoning behind the reaction time, as most of the peroxide dissipates in the first two hours.	There was a gradual decay in the generation of gas. The run plan called for runs of this duration, and the plan was followed.
16	3.4.2-3.4.3	3-27	It would be interesting to see a combination of these two figures, showing gas generation versus temperature to examine if there is a separate relationship between gas generation and temperature, as opposed to just gas generation and reaction time. Also, dividing the gas generation rate by the peroxide addition rate or something similar may reduce the dependence of the plotted gas generation rate on the products of peroxide deterioration.	We observe the same general correlation of gas generation and temperature increase. Since the preferred treatment method has changed, and we are busy with ozone tests, we prefer not to go back and re-analyze these data.